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Proceedings

National State Soil Scientist's Meeting - 2001

"Delivering Technical Soil Services"

Lawrence, Kansas
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Harney Silt Loam
Kansas State Soil

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WELCOME

Tomas M. Dominguez, State Conservationist Kansas
USDA Natural Resources Conservation Service, Salina, Kansas

Technical Soil Services in Kansas

I want to welcome you to Lawrence, Kansas.

Lawrence has a rich history, that any history buff may find interesting. For example, during the civil war Quantrill's Raiders attacked Lawrence in 1863. Lawrence is the home of the University of Kansas and the Jayhawk basketball. It is also the home of Haskell Indian Nations University. Over 135 tribes are represented in Haskell. No other Indian college is like it in the country. Kansas is also over 52 million acres in size, of which most is cropland. We have 100% coverage of soil survey information and are actively involved in soil survey maintenance issues.

As you know NRCS is the natural resources technical agency that addresses privately owned lands. With this comes the responsibility to deliver high quality natural resource information to the public, including the expertise needed in planning for sustainable resource management. All this is central around the planning process and ultimately the conservation plan. For my points of discussion this afternoon I would like to touch on the following:

- ✓ The ideals referenced in "A geography of hope" are still valid.
- ✓ Technical coordination of our natural resources across political boundaries.
- ✓ The Customer Service Toolkit as a planning tool that has been well received by Field offices in Kansas.
- ✓ The use of ArcView as a tool that enables the planner to more efficiently utilizes our spatial natural resources information.
- ✓ I would like to briefly discuss Technical Soil Service Activities in Kansas. (Wetlands, prime farmland, WRP, CRP, EQIP)

Key Points:

- ✓ That farmers, ranchers and other private landowners understand they have the care of the land in their hands.
- ✓ That our Agency will speak for the land.
- ✓ You as Soil Scientist have a large part in the wise use of our Soil Resources.

As you know similar soils occur on similar positions in a landform. They are not restricted to political boundaries. One of the primary maintenance activities in Kansas is addressing MLRA concepts. Kansas is working with the Northern Plains Region to coordinate resource data across political boundaries. Ecological Sites are being developed for MLRA 72 with Colorado, Kansas, and Nebraska. As a region we are leading the nation on Eco site development. Forage Suitability Groups (FSG) are being developed for MLRA 106 with Kansas and Nebraska. This too is on a good pace.

Even though as a whole NRCS is going this direction we to promote coordination in other guidance, such as Conservation Tree and Shrub Groups (CTSG) etc.

The above all take tremendous time and effort but this supports the infrastructure that makes us the best field technical delivery agency in the country and in government. We need to find ways to get this done. As we coordinate our Resource data layers we also need to look at our planning process. The 9 steps of planning are as valid as they ever were. This has never gone away.

However, we need to use new technology to improve efficiency and apply current resource data. And it needs to be delivered in a professional document. Customer Service Toolkit (CST) will help us address these items. We piloted 30 counties with CST last year. The pilot test showed support for CST from the field level. Based on this, we have completed CST training of all Field Offices in Kansas. We are using CST in all offices in Kansas this year.

ArcView was also tested by a number of field offices during FY2000. This test also showed support from the field. Its ability to use the latest imagery, utilize the latest spatial resource data, design field boundaries, label maps, and customize the map to meet the planner and customer needs, provides a valued companion to the CST. The spatial soil layer is in high demand with this tool as it allows for acreage calculations by map unit by field. This information assists with planning models for soil resource analysis and general program measurements. Training will begin in April and should be completed by October for Arc View with CST. A special session is being developed for Technical Soil Services staff at the field level to assist with GIS analysis in Soil Survey maintenance.

As mentioned earlier the spatial data is needed to assist field offices in the planning process. The spatial data is SSURGO. For this reason the SSURGO data needs to be referenced in the FOTG. Currently we have about 70 counties with SSURGO data available for CST. Plans are in place to complete the spatial layer for Kansas in FY 2002. Last year we piloted a process in Reno County, Kansas, using the Reno County, Soil Survey CD (using map finished SSURGO data) as the official source. If or when a change is needed to the Reno County Soil Survey, a CD can be issued in a short period of time. The hardcopy will serve as an archive data set. Needless to say the district and its customers are tickled to death. We are looking at ways to implement a method to expand the Reno County Soil Survey CD concept into other counties. Especially those that are out of print. Funds are the limiting factor.

Current status of SSURGO in Kansas.

71 Counties have SSURGO. We will complete the remaining counties before the end of FY 2002. The spatial data needs to be supported by fully populated attribute database. The source of this information is the National Soil Information System (NASIS).

Next to field office assistance this is the highest priority for the technical soil services staff in Kansas. It is time well spent in that effort. Currently there are 15 counties with NASIS generated information in the FOTG. 19 additional counties are in the review process.

Here is a quick look at our soils staff in the state.
Field Soil Scientist
- ✓ Soil Survey 4
- ✓ Technical Soils 11

MLRA/State Office Soil Scientist
- ✓ Soil Survey 4
- ✓ Technical Soils 2

Field soil scientists are located in 5 areas across the state.

The Area 3 office functions as an MLRA Project office. They have 2 Soil Survey Soil Scientists along with a Cartographer, Engineering, 2 Resource Soil Scientists, and Resource Conservationist support.

Soil survey soil scientists have identified Soil Survey maintenance needs within their local MLRA's. In addition, they assist with maintenance needs from other MLRA areas in the state. These maintenance issues are prioritized at an annual work planning conference.

Technical soil services are focused on field operations.
- ✓ 30% Wetland Determinations
- ✓ 20% Soil Survey Operations
- ✓ 20% Database Population
- ✓ 20% Field Office Assistance
- ✓ 5% Public Relations
- ✓ 5% Other

Field office support is provided primarily for wetland determinations and program assistance.

This year a significantly higher percentage of their time has been spent on NASIS population for updating Section II of the FOTG. (The Resource Soil Scientists collect soil survey maintenance issues from the field office and local agencies for future prioritizing.)

What Does All This Mean? NRCS needs to be recognized as the agency that provides the latest high quality, natural resources information. Soil is one of the natural resources that need to become information rich. This can only be done if NRCS provides consistent natural resources information. Specifically soils information is a critical cog in this whole endeavor. It is the fold that binds--But more than the choir needs to know this.

From a state's perspective here is some guidance on some next major broad steps to consider. SSURGO and NASIS have to become information friendly. Soil resource information for planning has to meet field office demands, such as those required by soil data viewer and computer models for resource analysis. The general public needs to be

able to access and understand the natural resource data that these sources provide. In other words, provided in an easily readable, downloaded format.

High quality soil scientists need to be recruited and retained. Soil scientists are hard to find and it is getting harder. We may want to start innovative actions such as a soils apprentice program. Anything to get them to us.

The love for the job of being a soil scientist working for NRCS needs to be cultivated and instituted in the minds and hearts of our new recruits. This is an action that has to be incorporated and followed up on. It is vital that they know what we do and how they fit in and what their role is doing for the effort.

Soil scientists need to understand and accept that the bread-and-butter of our agency is conservation planning. Their actions in soils allow that to happen. Without the planning effort nothing else can keep this agency going.

Finally---The value of soil health needs to be marketed as a key component in the benefit the public gets from clean water, air, and their quality of life.

Thank you and hopefully these comments will spur some dialogue that will add to a fruitful conference. Enjoy the rest of the week.

Introductions and Expectations

Maxine Levin, Soil Survey Division Program Manager
USDA Natural Resources Conservation Service, Washington, D.C.

This National State Soil Scientist's Meeting was organized and coordinated by the Kansas NRCS State Soils Staff and myself but the agenda came entirely from recommendations by the State Soil Scientists and their staffs. The Action Register Team, led by Dave Hoover, State Soil Scientist, ID, collected questions for panelists and plan to take notes throughout the meeting to address issues and concerns that come up from the participants. This year is a special year in that we are finally coming to a point organizationally and technologically that we can really start to focus on delivering the soil survey data and information to our customers, both inside and outside the agency. I think of it as reaching a critical mass—both in our knowledge base for technology and the number of people that we have here this week to "think-tank" some answers for the future. In particular we are going to focus on delivering technical soil services—the information that is derived from soil investigations and soil surveys—and building a corporate culture that will nurture this technology transfer in the agency.

I received this essay from an anonymous employee that expresses many of my thoughts and hopes for this meeting:

Some thoughts on Technical Soil Services and the State Soil Scientists' meeting.

When we reorganized soil survey into MLRA Offices, we put emphasis on the production aspects of soil survey and focused our attention on 17 states where the MLRA offices were located. This was natural for us because we are all comfortable with the production aspects of soil survey and we have a well-established corporate culture surrounding the soil survey inventory process. However, focusing our attention on 17 states left 33 state soil scientists wondering about their role in soil survey.

We could have presented the reorganization in an entirely different manner. We could have said to all 50 state soil scientists that since our primary soil survey inventory activities are coming to a close (more than 90% of private lands have initial mapping), we are shifting the production aspects of soil survey to 17 states. This shift will free up 33 state soil scientists to create the future of soil survey.

We know that Horace (Smith, Soil Survey Division Director) wants to have a strong technical soil services program and many of us wholeheartedly support his vision. But we don't have a well-established corporate culture surrounding tech services, at least not in the same manner as we have for production soil survey. Some of us don't know for sure what tech services really means. We don't have a Soil Survey Manual for tech services; we don't have fully organized policies and procedures established in the NSSH; we don't have a formal Field Guide for Technical Assistance; we don't have a system to foster career development in tech services. All of us know some aspects of tech services, but we don't have a well-established corporate infrastructure to support tech services and foster its growth.

Given the foregoing discussion, it seems we have an opportunity at the State Soil Scientists meeting to begin the process of creating a corporate culture for tech services and thus create the future of soil survey. We might ask the following questions: What does tech services mean? What are our roles and responsibilities? What is within our scope of authority? What is needed to make tech services work in the way it should? These questions, and others, could be debated in breakout sessions at the meeting. We would need to facilitate the sessions, compile the results and take action; otherwise the effort would be for naught. If Horace (Smith) gives us the license and encouragement to conduct this process, we have state soil scientists who have the personnel and political savvy; the budget, management, and organizational skills; the technical capacity; and the resources to direct their talent toward inventing the future of soil survey in technical soil services.

SOIL SURVEY DIVISION PRIORITIES AND OTHER KEY OPERATIONAL ISSUES[1] *Horace Smith, Director, Soil Survey Division*

USDA Natural Resources Conservation Service, Washington, D.C.

I want to quickly thank Tomas Dominguez, Rick Schlepp, Mickey Ransom, and others from Kansas for hosting this meeting. I also want to thank Maxine Levin from my staff for the hard work that she has done in developing the agenda and coordinating all aspects of this meeting. When we decided to have this meeting, I informed Maxine that we needed to let you, the State Soil Scientists, develop the agenda. That is exactly what has happened and I believe we all can agree that this is an excellent agenda. Technical soil services is an area of the Soil Survey Program that we are trying to enhance, as it deals with promoting the use of soil survey products and the application of soil science in support of field office activities. So, it is appropriate that the theme of this meeting is "Delivering Technical Soil Services". In support of this theme, we have several field soil scientists attending from various parts of the country who specialize in technical soil services. Later in the week, some of them will participate in panel discussions where they will share experiences involving the application of technical soil services.

I am glad that we were able to support the participation of at least one Soil Data Quality Specialist from each of the MLRA Offices and they will have concurrent sessions during this meeting. When Maxine began putting the agenda together, she asked me if I would give a brief update on the Fiscal Year 2001 Soil Survey Division priorities. In the time allotted to me, in addition to updating you on priorities, I would also like to briefly discuss a few other issues involving soil survey operations.

1. Populate and update the National Soil Information System (NASIS) with Quality Data
- ♦ October memo signed by the Deputy Chief
- ♦ Data to support field in preparing CNMP
- ♦ Others will talk in more detail on this topic

2. Implement Soil Data Warehouse
- ♦ Repository for all official soil survey data
- ♦ Official data for FOTG, customer service tool kit, NRI, new Farm Bill programs, etc.
- ♦ About $600,000 to implement; requested in FY-01 but not approved; will be requested again in FY-02
- ♦ Will streamline the way we do business and add efficiency

3. Develop an accountability process for non-mapping activities
- ♦ Team is being assembled to do this
- ♦ Have to work with the SP&A Deputy area

4. Product delivery--make soil survey products more accessible

[1] Key talking points presented at the State Soil Scientists Meeting, March 19, 2001, Lawrence, KS

- Traditional hard copy
- Print on demand version
- Web based
- CD ROMs
- Several States have developed versions; Oklahoma is latest to do so
- NCGC has assembled a team to evaluate all versions and will make recommendations to the Soil Survey Division

5. Complete revision of the State Soil Geographic Data Base (STATSGO) and Major Land Resource Areas (MLRA) publication and maps (Agriculture Handbook 296)

- Making excellent progress on this; thank states for their contribution and support
- This topic is on the agenda and a more detailed status report will be given later

6. Implement the expanded ("super") MLRA concept for field project offices

- This topic is on the agenda and Tom Calhoun will make a presentation later
- New MLRA Office in Kentucky
- Would like to emphasize that this is a very important initiative and we are making steady progress
- New technologies from various sources will play vital role in the successful implementation of this concept
- Several excellent presentations are on the agenda of this meeting concerning new technologies
- Show overlays for Indianapolis and Auburn MLRA Offices as examples
- Questions and answers handout
- No special budget for this yet

7. Emphasize technical soil services and urban interpretations

- Need to know difference between technical soil services and project-related activities
- Need to work with STCs to develop staffing plans that will emphasize technical soil services
- Special request for tailored urban interpretations
- Budget initiative to support urban interpretations
- Chief met with STC and several from the partnership in New Jersey to discuss compaction at construction sites and ways NRCS can provide assistance
- Soil Scientist at NSSC is contact for urban interpretations

8. NRCS Graduate Studies Program

- Soil Chemistry
- Soil Microbiology
- Soil Genesis and Classification
- Encouraged to apply

9. Budget Allocations

- CO-02 funds for project soil survey activities
- Technical soil services should be supported by benefiting fund

- Budget allocation process will be reviewed
- Special emphasis to be placed on MLRA updates and completing the once-over

10. Staffing

- Staffing at NHQ and SQI is stable with no vacancies
- Several important vacancies at the NSSC

11. Hiring New Soil Scientists

- About 930 NRCS soil scientists
- Workforce is aging
- Bringing on new hires is critical and some states are doing well in this area
- The Soil Survey Division is sponsoring a limited soil science scholars program to help ensure diversity as the current workforce continues to age out

12. World Soil Resources and International Travel

- Still strongly support international component of the Soil Survey Program
- Must support priorities of the agency
- Budget for international travel has not changed much over the past four years
- NHQ and NSSC scientists are on important international committees
- International meeting on Soils with Mediterranean Climates--Italy, September 2001
- 17th World Congress of Soil Science, Bangkok, Thailand, August 14-21, 2002
- World Congress of Soil Science to be in Philadelphia in 2006

13. Role of the State Soil Scientist

- Accountability
- Acres mapped
- Technical soil services versus project activities
- Manager of the CO-02 budget
- Develop a comprehensive staffing plan to support all soil survey-related activities
- Professionalism
- Write and publish technical papers
- ARCPACS Certification for State Soil Scientists

These are just a few points that I wanted to share with you. Again, I want to thank all of you for coming. I believe we are going to have an excellent meeting.

Partnership Activities in Kansas – Applications to Technical Soil Services---*Mickey Ransom, Department of Agronomy, Kansas State University*

A Memorandum of Understanding (MOU) was signed in 1953 between USDA – SCS and KAES. SCS is now NRCS, and KAES is K-State Research and Extension. The MOU has provided the basis for excellent cooperation and productivity. Should we update it?

We have had and are planning many cooperative efforts in the National Cooperative Soil Survey in Kansas. We have completed the "once-over" soil survey for all of Kansas. We have an active program for updates and MLRA partnerships. We work together in the Soil Survey distribution program; digitizing soil survey information – SSURGO certified; collecting laboratory data with Kansas Soil Characterization Laboratory and conducting many joint research projects.

Soil Survey Digitization Program was started in 1990 as a joint project between Agronomy Department, Geography Department, and NRCS. Kansas GIS Policy Board of the Kansas Water Office and NRCS funded it as part of an effort to develop a statewide GIS. The work was done in the GIS – Spatial Analysis Lab in Geography Department. A NRCS Soil Scientist with much mapping experience has always been available on site.

K-State has never provided funding for a soil characterization laboratory. Funding for the Kansas Soil Characterization Laboratory from NRCS started in 1992 using a per analysis basis. The Kansas Soil Characterization Laboratory can provide turn around time of about 4 – 6 months for analyses such as pH, OC, particle size, % B.S., carbonate content, bulk density, etc. The Laboratory supports the soil survey and provides for an active lab that helps with research activities.

Examples of Research Projects:

Land-Use Management Using SSURGO examined the use of SSURGO within a GIS coupled with remote sensing data for Finney County in western Kansas. The objectives were to: identify land-use change; evaluate influence of soils, groundwater, and physiography on land use; and present management alternatives.

Clay and Carbonate Movement examined processes of clay and calcium carbonate movement in 500 to 650 mm precipitation gradient. We looked at clay orientation:

- <500 mm – stress argillans not formed by illuviation
- 600 mm – both stress and illuviation argillans
- >650 mm – illuviation argillans

and found that pedogenic carbonates were associated with argillans and occur near the depth of wetting front.

Using SRPG Model for Tax Valuation of Irrigated Lands, we found that the Soil Rating for Plant Growth (SRPG) model works within NASIS. It arrays soil mapping units relative to their ability to promote crop growth, regardless of management practices and is currently used by the Kansas Department of Revenue for agricultural land valuation.

Goals of SRPG Project for Valuation of Irrigated Lands are to: provide additional testing of the SRPG model's ability to array soils; evaluate soil properties that are components of the SRPG model and affect yield under irrigation; use existing crop-growth models to study effects of soil properties on irrigated vs. non-irrigated yields; determine if existing SRPG model can be modified for irrigation; relate ratings determined with an irrigated SRPG model to those determined with the dry land SRPG model; and compare index values using the irrigated SRPG model to known yields.

Our project on Morphological Changes in Soils Caused by Long-Term Irrigation studies adjacent pedons of the same soil series that are non-irrigated and irrigated. With over 3 million acres of irrigated cropland in Kansas, we cooperate with NRCS on site selection and sampling. We are looking at field soil morphology, physical and chemical analyses, and micromorphology and saturation and reduction-oxidation measurements in soils of wetlands. NRCS is investigating methods of measuring saturation and reduction-oxidation in wetland soils. We are developing procedures for taking measurements in cropped fields. The pedologist and soil physicist from K-State are technical advisors. We provide technical help in design and testing of instrumentation and assist in field investigations.

Should we update the 1953 MOU?

- Agreed to items may be problematic
- Possible expansion of number of cooperating agencies
- University could decide to exercise more control
- University administrators do not understand NCSS
- Major questions about $$$

"If it ain't broke, don't fix it!

Planning for the Science of Soil Survey in the 21st Century--- *Maurice J. Mausbach, Deputy Chief for Soil Survey and Resource Assessment*

USDA Natural Resources Conservation Service, Washington, D.C.

As we enter the second century of soil survey, the theme "Delivering Technical Soil Services is very appropriate. Technical Soil Services are the main links to the user community. You should be proud of our efforts in soil survey, as you have maintained a viable soil survey program when soil survey has waned in other developed countries. We can contribute this to strategic thinking and good management from all of you as well as to the foundation of our predecessors. Charles Kellogg's leadership and foresight was critical in assuring that soil interpretations and outreach to the user of the information (what we now call technical soil services) was an integral part of the program. Another reason for the success of soil survey is that we kept on the cutting edge of technology. You have truly been leaders in this effort. However, as leaders we must not become complacent after all if we are leading the pack and slow down we'll get run over!

Today I will visit with you on some scientific considerations to assure a healthy and viable soil survey program. I will briefly discuss staffing, soil surveys – the process, development of new tools, and finish with technical soil services.

Staffing

The Science of Soil Survey first and foremost depends on highly motivated, innovative staff. We have an aging workforce. It is critical that we use the workforce planning tools and hiring authorities to address our needs for soil scientists. I am gratified that many of you are hiring soil scientists, although some of you are having trouble finding qualified candidates. It is essential to our success that we continue to hire the cream-of-the-crop. We need to work with universities to let them know of our staffing needs now so that we have qualified candidates in the pipeline. We also need to use all of the tools in our hiring authorities to attract and retain new soil scientists that reflect the diversity of our society.

I have a concern on the physical well being of our soil scientists. We all know the field soil scientist's job is a very physical one. We must assure the well being of our soil scientists who are often in the field by themselves and prone to job related injuries. I think we should revisit our model of what a soil scientist does. After all we have scientist in our title – how many scientists want to spend a considerable part of their time digging holes. We hire soil scientists to be scientists and to use their minds in developing soil-landscape models, we need to investigate ways to reduce the risk of job related injuries and keep the field soil scientist's job as interesting and challenging as possible.

Our soil scientists must be scientists. They need to keep abreast of the science and maintain professional contacts. That means they must READ, become active in professional groups and associations, and have opportunities for self-improvement. The Soil Science Society of American may not be for everyone, but it is the flagship

professional society for soil scientists. We must maintain contact with the society and provide our field soil scientists an opportunity to present papers at the SSSA meetings. After all, who know more about the soil-landscape relationship than our field staff? With respect to reading, our soil scientists need access to professional journals so they have an opportunity to keep up on the latest research. You may even want to consider adding an element to performance standards on reading scientific articles.

We need to maintain an active university presence in soil survey or pedology. The focus of pedologic research must expand to include both interdisciplinary studies to address application of the survey – Technical Soil Services. We must be proactive in working with university partners to help them obtain research grants and to work with university administration to assure they fill behind pedology professors. Horace and I are more than willing to work with you and visit with university administration on these issues.

Finally, we need to ask ourselves the question, why should society keep funding the Soil Survey Program? Can we get a champion for the soil survey program? What are you doing in your States to identify these champions? You state soil scientists are in pivotal positions for identifying potential champions for the program and developing the necessary contacts to further the program.

Soil Surveys – The Process and the Product

We have a proven scientific method for conducting the soil survey. Our recently revised Soil Taxonomy is used world-wide, we have a National Soil Survey Information System that houses a soil database worth billions of dollars and the envy of the world, and we are well on our way to providing soil survey information over the internet. So do we rest on our laurels? We must continue to evaluate the model for soil survey to assure that our science is current with the new analytical, geotechnical, and digital tools at our disposal. Healthy organizations are constantly reevaluating the way they do business. Thus, it is healthy for soil survey to continue to revisit the philosophical approach of soil survey. I challenge you to work with our research soil scientists and university partners to publish on the science and concepts of soil survey.

You have done an excellent job in putting the management structure in place for the Major Land Resource Area (MLRA) approach to soil survey. However, I sense that we are struggling with the scientific and operational processes for conducting an MLRA survey. It is absolutely crucial that we perfect the science for completing an MLRA soil survey to assure consistency of our product across geopolitical lines and to develop the most efficient means of updating soil surveys.

We have a tremendous opportunity to explore publishing soil surveys on the web and make them more easily available to a wider user group. It will also help address the backlog of manuscripts for printing. We need your help to investigate the feasibility and make it happen.

Interpretations of the soil survey for site-specific farming are putting new demands on the soil survey product. We have an opportunity to work with others to help farmers interpret yield maps using the soil survey and to discover what changes or additions are needed to make the survey for site specific farming. This is a prime example of where the soil-landscape model used to develop the survey could be extremely helpful in interpreting the map for these site-specific uses.

We just passed the 1000th milestone for the SSURGO digitizing project. That is a wonderful accomplishment and we owe each of you a debt of gratitude for the commitment you have made to the digitizing initiative. The SSURGO product is in high demand by the high-end GIS user; we still have some work to do to make the soil survey product useful to the general public. I know that some of you are making soil surveys available on CD-ROMs and there are some demonstrations here this week. I also am very impressed with the Lighthouse project of serving soil survey and related data. It is easy to use and requires little software at the user's computer. Continuing research and development activities on making to data and information accessible is crucial to the success of the soil survey.

Development of Technology

I want to talk about 3 areas of technology knowing that I am leaving out other important things. These areas are GIS, nondestructive geophysical investigations, and laser technology for in situ measurement of soil properties.

I have talked about GIS before and the need to fully utilize our digital geospatial data. We are the agency leaders in utilizing GIS through our soil survey operations and interpretations but the possibilities are almost unlimited. We are extremely good at the mechanics of using GIS and generating interpretative maps but we need to more fully explore the many nuggets of information contained within the geospatial data. We need research scientists looking at new ways of mining this rich data source. We have only touched the surface in the use of sophisticated statistical and other GIS techniques to provide interpretations and other information to our users.

About a month ago I attended a briefing on the Soil-Landscape Interpretations Model (SoLIM) being developed at the University of Wisconsin. This model has great potential for documenting landscape models we use in mapping soils. Not only will the system document these models in the GIS system but can be used to generate soil boundaries on a map for use in mapping activities. Thus the models can be tested and used to assist soil scientists in the soil survey process while documenting the model for later use in interpreting the data.

We have made great accomplishments in the use of ground penetrating radar and electromagnetic induction. These tools are extremely valuable in some soils and are not as useful in others. We need to continue to explore the use of these tools and others to assist in soil survey activities. Two weeks ago in Wisconsin, we talked a lot about the problems of mapping in the northern part of the State where soils are stony. We need

non-destructive methods to help soil scientist accurately map these soils without trying to beat a spade around the stones.

I am extremely excited about laser technology being developed at the Los Alamos National Laboratory (LANL). The instrument can measure total carbon in situ either along the side of a pit or through an access hole. In addition to total carbon the instrument can get most of the elements on the periodic table! We are working with LANL this year to further refine the instrument for use in the agency. One of the process issues to address is taking a representative reading since the laser focuses on a very small volume of soil.

Technical Soil Services

Technical soil services are crucial to the success of the soil survey program. We need to commit ourselves to adequate staffing and then train our soil scientists in the science of applying soil survey information and in the social aspects of delivering a product to the public. The State Soil Scientist is the key to a successful technical soil services program. We need your help and dedication. Technical soil services provide an excellent opportunity for us to reach out to new customers and obtain advocates for the program. Without the outreach I am afraid that the answer I posed earlier on should society continue funding the program will be NO because of ignorance or lack of access to the information not because we are providing an inferior product.

Summary

I see a bright future for the second century of soil survey. I think we are in the most exciting times ever in the life of the soil survey. We have electronic access to our product, we have wonderful new tools to map soils and to analyze the data, and we have many opportunities for research and development. First and foremost, we must attend to staffing and maintaining the scientific edge. We need to support pedology programs at our partnering universities. We need to continue to visit the scientific basis for the survey especially with respect to MLRA approach. We need to find new and innovative ways to mine our geospatial data. Finally, and most importantly, we need to get the product into the hands of the public.

Soil Interpretation in the Soil Survey – Past and Present

Berman D. Hudson, National Leader, Soil Survey Interpretations

During much of its history the Soil Survey has had an "on again off again" relationship with interpretations. During its first decade, the Soil Survey leadership emphasized their importance. Milton Whitney asserted in a 1906 speech, "…we knew that we must be able to interpret the soils we mapped or there would be little excuse for the Soil Survey." However, Whitney soon changed his tune. In 1914, he wrote in a letter that the purpose of the Soil Survey was limited to "… the gathering of fundamental soil information to be used as a basis for experimental work by other bureaus or offices." This view was later reinforced by Curtis Marbut, who wrote in 1924, "… the soil survey is being regarded more and more as a scientific publication and should not attempt to give practical advice."

This neglect of soil survey interpretations changed drastically when Charles Kellogg took over the Soil Survey in 1935. According to one author, "Soil survey interpretation, after a lapse of twenty years, again became recognized as an essential … function of the Soil Survey." Kellogg wrote in 1949: "Of course, soil surveys made for predictions about land-use and management … must be practical. But they will not be practical unless they are also scientifically sound." Under Kellogg's direction, numerous engineering interpretations were developed and soil surveys of urbanized areas were begun. Computerized procedures (e.g., the SOI-5 and SOI-6) were utilized to interpret soils consistently nationwide and to generate interpretive tables for soil survey manuscripts.

Providing computerized interpretations from a central source (the Statistical Laboratory at Ames, Iowa) provided consistency and increased the efficiency of manuscript publication. However, it had a downside. This process prevented field soil scientists from having a meaningful role in interpreting soils. It is hoped that the advent of the National Soil Information System (NASIS) will enable us to correct this. Specifically – we hope to change from a "top down" approach to one in which most soil interpretations are developed at the state or local level. In this scenario, interpretation specialists at the National Soil Survey Center (NSSC) will develop national interpretations or templates. Where appropriate, these national templates can be used unchanged at the local level. The national templates also can be modified to produce local interpretations that more closely reflect the laws, available technology and economic conditions at the state or local level. Additionally, we encourage local soil scientists to develop totally new interpretations for which no national templates exist.

Interpretation specialists at the NSSC will continue to have an important role in developing national templates. They also will conduct research and development in the science and practice of soil interpretation (for example, the application of fuzzy set theory). A third important role will be to provide training and consulting services to the field. However, interpretation specialists at the NSSC will play only a supporting role. The actual process of developing soil interpretations and providing them to users will increasingly be done in the field.

SOIL INTERPRETATION PRIOR TO 1935

MILTON WHITNEY (1906): "…WE MUST BE ABLE TO INTERPRET THE SOILS WE MAPPED OR THERE WOULD BE LITTLE EXCUSE FOR
THE SOIL SURVEY."

MILTON WHITNEY (1914): A DIFFERENT TUNE: SOIL SURVEY SHOULD BE LIMITED TO "…THE GATHERING OF FUNDAMENTAL SOIL INFORMATION
… TO BE USED BY OTHER BUREAUS OR OFFICES."

CURTIS MARBUT (1924): "…THE SOIL SURVEY IS BEING REGARDED MORE AND MORE AS A SCIENTIFIC PUBLICATION AND SHOULD NOT ATTEMPT TO GIVE PRACTICAL ADVICE."

SOIL INTERPRETATION AFTER 1935 – THE KELLOGG YEARS

ANONYMOUS AUTHOR: "SOIL SURVEY INTERPRETATION, AFTER A LAPSE OF 20 YEARS, AGAIN BECAME RECOGNIZED AS AN ESSENTIAL FUNCTION OF
THE SOIL SURVEY."

UNDER CHARLES KELLOGG:

-- NUMEROUS ENGINEERING INTERPRETATIONS DEVELOPED
-- SOIL SURVEYS OF URBAN AREAS WERE BEGUN
-- FORESTRY, WILDLIFE AND RANGE INTERPRETATIONS INITIATED
-- COMPUTERIZED INTERPRETATION SYSTEM (SOI-5 AND SOI-6) DEVELOPED
COMPUTERIZED SOI-5/SOI-6 PROGRAM

POSITIVES:

CONSISTENCY – STATE TO STATE, ETC.
EFFICIENCY – MANUSCRIPT PUBLICATION

NEGATIVES:

TOP-DOWN, UNWIELDY
BAD CORPORATE VISION:

⇓

"SOILS ARE MAPPED LOCALLY, BUT INTERPS ARE MADE AT THE NATIONAL LEVEL BY A GROUP OF SPECIALISTS."

NEW CORPORATE VISION:

ROLE OF STATES:

**MOST SOIL INTERPRETATIONS WILL BE DEVELOPED AT THE STATE AND LOCAL LEVEL. POSSIBLE BECAUSE INTERPRETATION FUNCTIONS OF NASIS WILL BE AVAILABLE AT ALL LEVELS.

ROLE OF NSSC:

1. DEVELOP NATIONAL INTERPRETATIONS TEMPLATES
2. R&D ACTIVITIES RELATED TO SOIL INTERPRETATION (ex. FUZZY SETS, CORROSION)
3. TRAINING AND CONSULTING SERVICES TO THE FIELD AND TO COOPERATORS

CHALLENGES FOR SOIL INTERPRETATION:

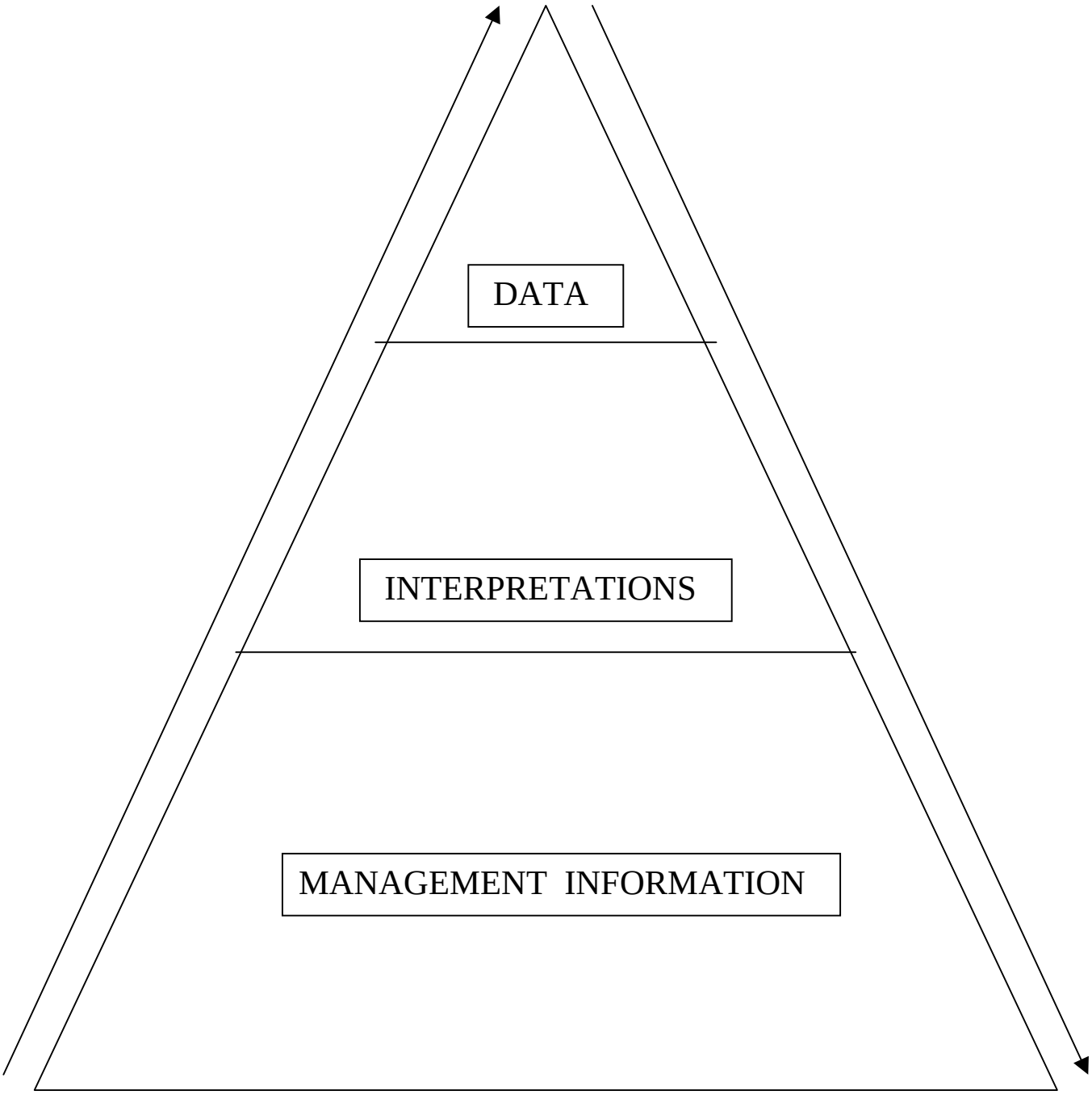
1. DATA, INTERPRETATIONS, AND MANAGEMENT INFORMATION – WHAT IS THE RIGHT MIX?
2. GETTING BEYOND THE POLYGON-BASED MAPPING MODEL.

THE RIGHT MIX -- CLIENT HIERARCHY:

The triangle on the following page shows the relationship between the kinds of soil survey information provided and the number of potential clients.

Key Points:

1. A small number of sophisticated clients use soil data.
2. A larger number of clients use soil interpretations.
3. The largest number of potential clients, typically individual landowners, can best use management information based on soils data and interpretations.
4. Conservationists in NRCS deliver much of the soil-based management information. It is important that the Soil Survey maintain good relationships with our parent agency.
5. Being part of an action conservation agency is a part of the reason the Soil Survey has been so successful for so long. **Client Hierarchy**:


DATA
INTERPRETATIONS
MANAGEMENT INFORMATION

GETTING BEYOND THE POLYGON-BASED MAPPING MODEL
LIMITATIONS:
1. LEVEL OF DETAIL (SIZE OF DELINEATION) IS LIMITED BY MAP SCALE.
2. COMPONENTS ("INCLUSIONS") IN DELINEATIONS CANNOT BE LOCATED ON THE LANDSCAPE.
3. WE ARE FORCED TO PRETEND THAT ALL CHANGES IN SOIL TAKE PLACE SUDDENLY AT THE DELINEATION BOUNDARY.
IMPLICATION
LIMITATIONS 1, 2 AND 3 ABOVE LIMIT THE ACCURACY AND PRECISION WITH WHICH WE CAN INTERPRET SOIL MAPS

PANEL OF RESOURCE SOIL SCIENTISTS FROM THE FIELD: Case Studies in Typical Workloads

(Richard Bednarek, Atlantic, IA; Ramiro Molina, Corpus Christi TX, Glenn Stanisewski, Davis, CA)

Richard Bednarek, Atlantic, IA

The following list is some of the Technical Soil Services provided by soil scientists in Iowa:

Customer Service Tool Kit Deployment
Soils Training to Field Office Staff
Soil Quality Training and Assessment
Field Office Technical Guide maintenance
Conservation Education - Soil Judging, Envirothons, Outdoor Classroom
Pond Site Determination
Water Table Monitoring
Archaeological Investigations
Wetland Determinations and Training
Training to County Sanitarians for Waste Water / Septic Systems
Tours / Field Days - SWCD's, local government, public
Assistance to Extension and ARS Research Stations
FPPA determinations and reports
ISOIL / ARCVIEW / GIS products and support
IOWATER volunteer water quality monitoring program
Residue Management Task Force
DC / Technology / Area Staff meetings
Nutrient Management CNMP issues
Carbon Issues
CRP appeals and determinations
Rental Rates and CSR appeals
Urban Planning

The soils program in Iowa is unique in that the Resource Soil Scientists are responsible for Technical Soil Services and the Soil Survey Updates. I am responsible for the soils program in 24 counties in Southwest Iowa. There are two GS-11 soil scientists and we

are going to hire a GS-5/7/9 soil scientist for a full staff. We spend about 50 percent of our time on Technical Soil Services and 50 percent of our time on Soil Survey Updates. We all work on the soil survey update during prime field season. I want everyone in the office to do both Technical Soil Services and the Soil Survey Update to better serve our customers and prepare them for future positions.

We are currently updating the Shelby County Soil Survey and we have 5 counties, in Southwest Iowa, in need of an update. We are currently promoting a soils update in Adams County. We have to start now in order to get them signed in time to start the fieldwork after Shelby County is complete.

Our Technical Soil Services is divided into:

-Site Investigations
-Soils Training
-Special Studies
-Education
-Soil Tours

I was able to get the Murray High School FFA students to assemble the Soil Quality Test Kits for us. We also have a soils lab set up at the Anita High School.

Ramiro Molina, Corpus Christi TX

Duties

1. Soils Technical Specialist for Corpus Christi Zone (3) on the ASC-FO staff:
    a. Provide soils technical assistance to 48 offices in 21 Resource Teams dealing with programmatic issues i.e. CAFOs, CRP, ECP, WRP, etc.
    b. Maintain and Update FOTGs Section II (Prime, Hydric, Hel lists).
    c. Do request soil mapping for programs and Non-project County.
    d. Assist in training FO staffs on CSTK and Soil Data Viewer.
    e. Serve on Quality Assurance Review teams for zone and state levels.
    f. Provide soils training and Uses of soil surveys to FO staffs.
    g. Member of the Zone Technical team where the issue may involve multi-disciplines:
        1. Wetland Delineation and Determination team - soil scientist, biologist, & engineer (COE 1987 Manual Training for non-agriculture and some FSA assistance).
        2. Provide NASIS reports to the range specialists to use in updating Ecological Sites.
        3. Provide NASIS reports to other discipline specialist to update Section III of the FOTG.
    h. Represent the ASC-FO on Project Soil Surveys activities i.e. IFRs, PFRs, Technical Visits, Soils Sampling, and Soil mapping details.

2. Provide Assistance to the State Soil Scientist:

a. Responsible for NASIS Data Base Certification (50 Counties) for Customer Service Toolkit and Soil Data Viewer.
b. Update STATSGO map for Texas
c. Update Land Resource Regions and Major Land Resource Areas of the United States (Agriculture Handbook 296)
d. Technical advisor for the SSURGO compilation team at Robstown, Texas.
e. Participate in technical visits, field reviews, soil samplings, soils mapping details and other project soil activities.
f. Assist with special projects:
    1. Soil moisture monitoring projects
    2. Soil temperature study
g. Serve on Soils Technical Teams for the State -
    1. Work on Soil Business Plan for MLRAs 150 and 83.
    2. Work with other RSSs.
h. Promote soil surveys in Zone 3.

3. NRI Team Leader for the Corpus Christi Zone:
    a. Members - Biologist, Range Management Specialist, and Agronomist
    b. Make sure national and state training gets to team members.
    c. Secure necessary equipment, imagery, supplies, etc. from state to complete inventory.
    d. Get instruction manuals and procedures to team members and coordinate with everyone concerned.
    e. Keep inventory on schedule.
    f. Monitor quality and complete edits as needed.
    g. Report progress to ASC-FO and team members.
    h. Prepare for the next inventory.

4. Zapata County Soil Survey Project Leader:
    a. Conduct Technical reviews and visits with SDQSs.
    b. Conduct soils mapping details.
    c. Conduct soils sampling.
    d. Conduct field quality check on fieldwork done.
    e. Update and maintain soil survey handbook.

5. Cultural Resources Coordinator for the Zone. Texas does have a Cultural Resource Specialist.
    a. On-site work with FO staffs.
    b. Provide training to FO staffs as needed.

6. Member of the Texas Development Team in testing Customer Toolkit when it first came out. Will assist Implementation Team with training to Field Offices as needed.
    a. Received training from State Office (ArcView and CST)
    b. Testing and evaluating of CST in the field.
    c. Assist Implementation team with training of FOCS

7. QIP team member that work on the current Appraisal system to use as a management tool for awards and improvement opportunities.
   a. Worked with State Office and worked up procedure how to use.
   b. Assist with training FO staffs on how to use.

8. Education, Public Information, and Outreach Activities:
   a. Teacher workshops and conventions
   b. School presentations - both primary and secondary schools
   c. Land Judging contests
   d. Career days at different universities.
   e. Fairs and stock shows

9. Working with Partnerships:
   a. Universities:
      1. TAMUK -soil moisture monitoring sites.
      2. TXAMU, Baylor University, and University of Tennessee - Paleo-vertisols study.
   b. Agriculture Research Station - provide on-site evaluation of soil mapping and soil sampling for Precision Land Farming.
   c. Texas Agricultural Extension Service, SWCD, and Monsanto
      1. Farming for Excellence Demonstration (1 of 5 in the nation). Tillage System Demonstration (Reduced, No-till and Conventional). NRCS provides Infiltration tests and sample soils for Bulk density.
      2. Nueces County Crop Committee is looking at conventional tillage in Nueces County, Texas

Glenn Stanisewski, Soil Resource Specialist, NRCS, Davis, CA

I believe the only thing that is typical of our workloads (as Resource Soil Scientists) is how atypical they can be. Differences in the natural resource base (as described by MLRAs), applicable conservation programs, and regional and state priorities can result in large differences in workloads between Resource Soil Scientists from Region to Region and from State to State. Also, differences in the way states' build and organize their soils staffs and administer their soil survey programs has a profound effect on what the workloads turn out to be. What we have in common as Resource Soil Scientists though are the abilities, skills, and experience needed in order to successfully carry out the soil survey program and our agency's mission.

As a Resource Soil Scientist located at a State office, there are some things which a Field or Area office soil scientist may not get involved with. Some examples are: Technical lead in Quality Control/Quality Assurance for SSURGO certification of Soil Surveys, the formation and coordination of MOAs (Memoranda Of Agreements) for reimbursable projects with state and other federal agencies, and assisting the State Soil Scientist in the scheduling, coordinating, and analyzing of the annual SSURGO workload. Also, I am often asked to be a member of state wide training cadres to instruct Area and Field Office

staff in such areas as: Hydric Soils, Wetland Determinations, Water Quality, and Nutrient and Pest Management.

However, Resource Soil Scientists regardless of where we are located need to possess certain skills. An ability to take an interdisciplinary approach in working with other specialists (e.g. Agronomists, Resource Conservationists, Water Quality Specialists) in addressing natural resource concerns is essential. Also possessing a set of multi-disciplinary skills in having the ability to see how soils data, information affects all of the natural resource concerns, and how to apply soils knowledge in addressing these concerns is equally important. Today, Resource Soil Scientists must have a working knowledge of the concepts of Water Quality, Water Quality Impacts and Concerns, and how soils data/information relates to Water Quality. In California and most of the arid and semi-arid West, Resource Soil Scientists need to have an understanding of Air Quality concerns and how the combination of soil properties and land use activities impact and influence Air Quality issues. Resource Soil Scientists should be able to see the connections between the social-economic impacts of urban sprawl and farmland conversion and the subsequent natural resource concerns of wildlife habitat and bio-diversity losses.

These are just a few examples of the Natural Resources "Big Picture" which Soil Resource Specialists need to be able to grasp and help provide answers and solutions to.

Marketing Soil Survey

Gary B. Muckel, NSSC

Marketing wraps into most responsibilities for all soil scientists. Products including soil maps and text target various purposes and audiences. All soil products aim toward "Helping People Understand Soils."

The Soil Survey Division implements an outreach program and builds alliances with potential users of soil survey information. Town hall meetings that are held regionally for on-farm contacts with users provide customer contacts and feedback into the needs and formats for soil survey information. The National Cooperative Soil Survey is built around partnerships and addressing user needs. These tenants are successful marketing tools and have led to the continued existence of the soil survey in the US. The challenge is to strengthen these efforts and build new alliances for new applications.

Marketing is a process of organized thought and action that helps achieve product or organizational goals. Our organizational goal is to help people conserve, improve, and sustain our natural resources and environment.

Marketing is divided into passive and active forms. Every interaction is passive marketing. The way you answer the phone, timeliness of your assistance, quality of your help, professionalism of your staff, and appearance of you, your products, and office are passive marketing. Create an image that appeals to the interests and desires of key audiences within our agency and through all potential users of our information.

Active marketing is a focused effort, requires customer involvement, supports agency goals, and is organized with several steps as a plan. The steps are: **1) Prepare a goal statement; 2) Identify target groups; 3) Research the target clients and the conditions; 4) With the client, identify specific objectives; 5) Develop your market position; 6) Develop strategic and tactical plans; 7) Implement the action plan; and 8) Evaluate the plan.** These steps are similar to the Memorandum of Understandings for soil surveys and to conservation plans.

Marketing focuses efforts and resources, increases efficiency, and support agency missions. The spin-offs are greater exposure and increased support.

The following goals and target groups are suggested for yearly marketing efforts. The list will be presented to the National Soil Survey Conference in June. State Soil Scientists are encouraged to respond to the list and offer suggestions for different goals and target audiences.

- 2001 Incorporate soils into natural resource education and target science teachers.
- 2002 Improve soil management on working lands and target land managers and their advisors including field office staffs of NRCS.
- 2003 Reduce loses of life and property due to improper soil selection or management and target homebuilders, land use planners, and land contractors.
- 2004 Expand understanding and protection of wildlands and target wildland managers, education interpreters, and others that work on state and Federal parks, and military land.

Marketing is working with and helping people understand soils.

CONSERVATION PROGRAMS Panel 1
Interpretations & Technical Soil Services

(Panel-DeWayne Mays(NSSL), Bob Nielsen(NSSC), Joyce Scheyer(NSSC),Ron Harris, AFO, Stefanie Aschmann, WSI, Robert Weatherspoon, Lake City FL)

Selection of an Appropriate Phosphorus Test For Soils

DeWayne Mays(NSSL)

M.A. Elrashidi
USDA, National Resources Conservation Service
National Soil Survey Center, Soil Survey Laboratory
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Phosphorus and Eutrophication

Phosphorus (P) is an essential element for plant growth and is often applied to agricultural land to increase crop production. Animal waste generally has a high concentration of P. Livestock feedlots and cattle grazing on grassland can introduce substantial amounts of P-rich manure to the environment. Nonpoint sources of P, such as surface runoff and subsurface leaching from agricultural land and livestock operations, are major contributors to eutrophication in freshwater bodies. Eutrophication has been linked to a variety of ecological and health problems, ranging from increased growth of undesirable algae and aquatic weeds to fishkills and human illness.

Phosphorus Loss From Soil

Phosphorus is lost from agricultural land to surface water bodies in sediment-bound and dissolved forms. Sediment-bound P includes P associated with minerals and organic matter. Dissolved P constitutes 10 to 40 percent of the P transported from most cultivated soils to water bodies through runoff and seepage (Sharpley et al., 1992). Surface runoff from grassland, forest, and uncultivated soils carries little sediment and carries dominantly dissolved forms of P. Unlike sediment-bound P, dissolved P is readily bioavailable and thus is the main cause of eutrophication. A concentration of P above 0.02 ppm in lake water generally accelerates eutrophication (Sharpley et al., 1999). This concentration is much less than the P concentration in soil solution of cultivated soils and leads us to an important question regarding the relationship between P in soil and surface runoff. Selection of an appropriate soil test is essential for understanding this relationship and for identifying nonpoint sources of P contamination from agricultural land.

Soil Phosphorus Tests

Many chemical solutions have been proposed to extract potential forms of P in soils. Water probably was the first extractant that researchers applied to measure P in soils. The small amounts of soil P extracted by water (mainly P in dissolved forms) and difficulties related to chemical analysis limit the use of water as an extractant.

Bray and Kurtz (1945) suggested a combination of HCl and NH_4F to remove easily acid soluble P forms, largely Al- and Fe-phosphates. In 1953, Mehlich introduced a combination of HCl and H_2SO_4 acids (Mehlich 1) to extract P from soils in the north-central region of the U.S. Sulfate ions in this acid solution can dissolve Al- and Fe-phosphates in addition to P adsorbed on colloidal surfaces in soils. In the early 1980's, Mehlich modified his initial soil test and developed a multi-element extractant (Mehlich 3) which is suitable for removing P and other elements in acid and neutral soils. Mehlich 3 extractant (Mehlich, 1984) is a combination of acids (acetic [HOAc] and nitric [HNO_3]), salts (ammonium fluoride [NH_4F] and ammonium nitrate [NH_4NO_3]), and the chelating agent ethylenediaminetetraacetic acid (EDTA).

Olsen et al. (1954) introduced 0.5 M sodium bicarbonate ($NaHCO_3$) solution at a pH of 8.5 to extract P from calcareous, alkaline, and neutral soils. This extractant decreases calcium in solution (through precipitation of calcium carbonate), and this decrease enhances the dissolution of Ca-phosphates. Moreover, this extracting solution removes dissolved and adsorbed P on calcium carbonate and Fe-oxide surfaces.

The concept of P-sink was applied to measure the amount of soil P which can be released in response to such sink. An anion exchange resin (AER) and Fe-oxide impregnated paper (IIP) were used (in a water matrix) as a P-sink to determine available P in a wide range of soils. Recent publications describe AER (Sharpley, 2000) and IIP (Chardon, 2000) methods.

Selecting an Appropriate Test

When extracting solution is added to soil, there are four basic reactions by which P is removed from the solid phase: 1) dissolving action of acids, 2) anion replacement to enhance desorption, 3) complexing of cations binding P, and 4) hydrolysis of cations binding P. Therefore, the selection of a P soil test depends on the chemical forms of P in the soil.

One can conclude that for acid and neutral soils, Al- and Fe-phosphates are the primary source of P. A soil extractant that removes these minerals along with dissolved and adsorbed forms should be a good choice. Either Bray 1 or Mehlich 3 can be used successfully. Mehlich 3 may be preferable, since it can also remove available forms of macronutrients (Ca, Mg, K, and Na) and micronutrients (Cu, Zn, Fe, and Mn) for analyses of these soils.

Calcium phosphates are the main P minerals in alkaline and calcareous soils, whereas neutral and slightly acid soils (pH 6 to 7) may contain both Ca- and Al-phosphates. The $NaHCO_3$ extractant (Olsen et al., 1954) can remove Ca-phosphates and phosphate adsorbed on surfaces of calcium and magnesium carbonates along with Al-phosphates and is considered the most suitable P test for these soils.

A water extract removes dissolved forms of P but very little of the adsorbed and mineral forms. It is suitable for both acid and calcareous soils. The amount of P extracted is small

for most soils, and may not reflect all forms of labile P. A P-sink in a water matrix can remove more P from soil than water extract alone. As an alternative to water, either the AER or IIP method can be used to measure bioavailable P in soils.

The soil properties affecting selection of the appropriate P test and recommended methods are outlined in the table that follows.

Soil properties affecting selection of the appropriate phosphorus test and recommended methods

Soil	pH	Minerals	Methods
Acidic	<6.0	Al-P, Fe-P, and Mn-P	Bray 1, Mehlich 1, Mehlich 3, Water, IIP, and AER
Slightly acid to slightly alkaline	6.0 to 7.2	Al-P, Fe-P, Mn-P, Mg-P, and Ca-P	Bray 1, Mehlich 1, Mehlich 3, Olsen, Water, IIP, and AER
Alkaline, calcareous	>7.2	Ca-P and Mg-P	Olsen, Water, IIP, and AER

References

Bray, R.H., and L.T. Kurtz. 1945. Determination of total, organic, and available forms of phosphorus in soils. Soil Sci. 59: 39-45.

Chardon, W.J. 2000. Phosphorus extraction with iron-oxide impregnated filter paper (P_I test). pp. 26-29. *In* G.M. Pierzynski (ed.), Methods for phosphorus analysis for soils, sediments, residuals, and waters. Southern Cooperative Series Bull. XXX.

Mehlich, A. 1984. Mehlich 3 soil test extractant: A modification of Mehlich 2 extractant. Commun. Soil Sci. Plant Anal. 15: 1409-1416.

Nelson, W.L., A. Mehlich, and E. Winters. 1953. The development, evaluation, and use of soil tests for phosphorus availability. Agronomy 4: 153-188.

Olsen, S.R., C.V. Cole, F.S. Watanabe, and L.A. Dean. 1954. Estimation of available phosphorus in soils by extraction with sodium bicarbonate. U.S. Dep. of Agric. Circ. 939.

Sharpley, A.N. 2000. Bioavailable phosphorus in soil. pp. 38-43. *In* G.M. Pierzynski (ed.), Methods for phosphorus analysis for soils, sediments, residuals, and waters. Southern Cooperative Series Bull. XXX.

Sharpley, A.N., T. Daniel, T. Sims, J. Lemunyon, R. Stevens, and R. Parry. 1999. Agriculture phosphorus and eutrophication. ARS-149, U.S. Dep. of Agric., Washington, D.C.

Sharpley, A.N., S.J. Smith, O.R. Jones, W.A. Berg, and G.A. Coleman. 1992. The transport of bioavailable phosphorus in agricultural runoff. J. Environ. Qual. 21: 30-35.

State Soil Scientist Meeting Comments, Dewayne Mays

I. I have participated in four CNMP Training sessions. We have one more session next week in Ft. Worth. There have been very few soil scientists to participate in the sessions. Soil Scientists should have an important role in the training and understanding phosphorus information. They should have an important role in the collection and interpretation of data that will be necessary in order to implement CNMP's. They will be one of the most important resources that the conservation planner will have at their disposal. There is a large amount of research information in universities, in ARS, and other sources. Also, there is a large amount that is being developed and will become available. Information that is being developed in the National Soil Phosphorus Benchmark Project is an example. There are about 23 universities with runoff projects. ARS has about 16 runoff projects underway. In addition to the related projects underway at the Soil Survey Laboratory and the National Soil Survey Center, there are NRCS State Offices that also have projects. Each state will need persons who have the ability to apply these kinds of information to their specific needs.

II. Data and Database Impacts
   A. The importance of much of the P work is that we are attempting to tie as much to soil survey in order to take advantage of the tools that are available or associated with the soil survey program. A number of phosphorus related data elements will be developed and become a part of the National Soils Database. Efforts are underway to expand the database to accommodate the needs for CNMP's.

III. Phosphorus Indexes Versus a National Phosphorus Index
   A. At this time there is no plan to develop a National P Index to replace the many different indexes in place. There will certainly be phosphorus parameters that will be used to describe Benchmark Soils. These parameters maybe used to either develop models, or modify existing models in order to satisfy current needs.

IV. Soils 10's
   A. The National Soil Survey Center is in the process of trying to place Soils 10 data in electronic form so that it can be made a part of the Soils database. Much of the data from forms that we have on hand at the NSSC have been entered. However, there may be a number of forms in file cabinets that could be entered. If you will send me a copy of your Soils 10's, we will enter them and send you an electronic copy of the data. We will need you to check the data and enter the latitude and longitude for each site. The importance of these data are that it is measured engineering data that scientist have used as estimates many of the values for interpretations.

Urban Soils Update, Joyce M. Scheyer

Urban Soils Symposia

There is an excellent opportunity to present volunteered oral presentations or posters at the SSSA Annual Meeting this year. Projects can be presented jointly with your NCSS cooperators to showcase field soil survey. Remember that in the scientific community you must publish or others cannot find your work. Presentations at the meetings keep us visible and help with funding.

⇒ Soil Science Society of America Annual Meeting (SSSA)
Audience of over 12,000 professionals in Agronomy and Soils including private consultants, researchers, and field soil scientists
Charlotte, North Carolina October 21-25, 2001

⇒ Symposia planned for 2001 by Urban Soils Committee (Joyce Scheyer, chair):
1. Urban Wetlands sponsored by Division S-10 Wetland Soils
Urban Landscapes and Soil Quality on Restored Urban Soils
(ranging from container gardens to putting greens)
Sponsored by Divisions S-5 Pedology, S-11 Soils and Environmental Quality, and S-6 Soil and Water Management and Conservation
Title-Summary forms should be 25 words plus title and author
Submit Title summaries online ONLY at www.soils.org

For assistance with Title-summaries or finding co-authors contact
Dr. Joyce M. Scheyer, soil scientist, National Soil Survey Center, NRCS
(402) 437-5698 joyce.scheyer@usda.gov

Current examples of Urban Soils Projects in NRCS

⇒ Small Fruits Interpretation Guide (for Native American Gardens in New York State)
⇒ Paired analysis of sites for urban soil assessment and characterization (Connecticut)
⇒ Cadmium/Zinc ratio established as indicator of human dietary risk from urban gardens. This was a significant research and development step that was well received by the international urban soils community. Additional ratios and metal bioavailability thresholds will be explored to develop an "indicator garden". (NSSC).
⇒ Urban soil map unit composition is a major issue for NASIS data entry before interpretations can be made. At this point we need to describe and map urban soils as we identify them even if data is temporarily stored in a supplementary data base until we can add it to NASIS. Correlation of urban soils is an upcoming major issue for 2002. (NSSC)
⇒ The Virtual Urban Soil Workgroup of NRCS field soil scientists meets by email and teleconference on demand to discuss compaction, contamination, and conventions for urban soil mapping. This group was represented in a poster at Soil and Water Conservation Society Meetings in 2000 by Betty McQuaid of Watershed Science Institute with contributions from projects in various states.(40 soil scientists in states)

Recommendations for 2002

A national Urban Soils workshop in 2002 is needed to strengthen bridges between urban soils and urban conservation programs. Topics proposed are:

- Strategic Planning for Urban Soils within Soil Survey (mapping, classification, interpretations, taxonomy, program applications, urban research needs for NCSS)
- Linking Urban Soil Interpretations to Conservation Practices (especially PAM erosion control, critical area planting, composting, and waste utilization).
- Cross-training for conservationists with modules on Basic Soils for Resource Conservationists and Basic Planning for Resource Soil Scientists.
- Draft Technical notes or issue papers on selected topics in Urban Soils such as Backyard Soil Catenas, interim mapping and classification of vertical discontinuities, and Restoration of Compacted Soils.

Posters available from NSSC on urban soils

Scheyer, J.M. 2000. **Estimating Dietary Risk in Soils from Urban Gardens**. First International Conference on Soils of Urban, Industrial, Traffic, and Mining Areas (SUITMA), Essen, Germany (Slides in Powerpoint)

McQuaid, B. and J.M. Scheyer. 2000. **Virtual Urban Soils Workgroup.** Soil and Water Conservation Society Annual Meeting.

Scheyer, J.M. and C. Adams. 1999. **Interdisciplinary Applications of Urban Soil Survey.** Agronomy Abstracts. Soil Science Society of America Annual Mtg, Salt Lake City, Utah.

Scheyer, J.M. and C.A. Wettstein. 1999. **Soil Survey – A nationwide resource and an underused environmental screening tool.** Association for the Environmental Health of Soils (AEHS) Annual meeting, Amherst, Massachusetts.

Scheyer, J.M. and R.D. Nielsen. 1998**. A modular system to urban soil survey interpretations for recreational development.** Agronomy Abstracts. Soil Science Society of America Annual Meeting, Baltimore, Maryland (Slides in Powerpoint)

Russell-Anelli, J., R. Bryant, and J. Galbraith. 1998. **Soil characteristics, land practices and element content: evaluating the predictive properties of soil survey.** Presented at the ICOMANTH Tour of NV-CA, September 1998.

Scheyer, J.M., S.G. Aschmann, and D.P. Anderson. 1997. **Urban soil talking points: common ground for resource partnerships.** Agronomy Abstracts. Soil Science Society of America Annual Meeting, Anaheim, California. *Proposed series of fact sheets including phosphorus, metal toxicity, PM10

Bryant, R.B., J.M. Scheyer, and J.M. Russell-Anelli. 1997. **Urban soil survey interpretations for heavy metals.** Agronomy Abstracts. Soil Science Society of America Annual Meeting, Anaheim, California.

Scheyer, J.M. and L.D. Quandt. 1996. **A framework for making urban soil survey interpretations**. Soil and Water Conservation Society Annual Meeting, Keystone, Colorado.

*** A Selected Bibliography of Urban Soil References, Posters, and Papers (1996-2000) is nearly completed at NSSC and will be made available to states.**

CNMP's and Animal Feeding Operations, Ronald Harris, AFOD

Livestock manure has emerged over the past several years as a major environmental issue, with significant social and political considerations. As a result, national policy attention has also become focused on animal feeding operations over the last few years, as symbolized by the issuance of the "United States Department of Agriculture's (USDA)/Environmental Protection Agency's (EPA) Unified National Strategy for Animal Feeding Operations" in March 1999.

The Unified National Strategy for Animal Feeding Operations (UNSAFO)
The Unified Strategy presents USDA and EPA's plan for addressing the water quality and public health impacts associated with Animal Feeding Operations (AFOs).

A key action identified in the UNSAFO to assist in addressing the potential nonpoint source pollution problems associated with AFOs was for USDA to issue technical guidance for the development of Comprehensive Nutrient Management Plans (CNMPs). The strategy also states that CNMPs will be developed by certified specialists.

USDA's Technical Guidance for Developing CNMPs
The USDA's Natural Resources Conservation Service (NRCS) released for public comment the draft "Technical Guidance for Developing CNMPs" in December of 1999. The final Technical Guidance is scheduled for release in August of 2000. The Technical Guidance defines what a CNMP is, and addresses the key elements to consider in the development of a CNMP. The Technical Guidance is a document intended for use by those who will be developing or assisting in the development of comprehensive nutrient management plans.
The purpose of this document is to provide technical guidance for the development of CNMPs, whether they are developed for USDA voluntary incentive programs or as a means to comply with United States Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) permit requirements. The Technical Guidance is intended to be used in conjunction with NRCS' existing planning procedures and other technical references to effectively address both management activities and natural resource concerns associated with minimizing the potential adverse impacts of animal feeding operations on water quality.

What is a CNMP?
A CNMP is a conservation system for animal feeding operations that addresses Field Office Technical Guide quality criteria to the resource management system (RMS) level for water and soil resources. The development of a CNMP needs to address the following six elements:

1. Manure and Wastewater Handling and Storage - This element addresses the components and activities associated with the production facility, feedlot, manure and wastewater storage and

treatment structures and areas, and any areas or mechanisms used to facilitate transfer of manure and wastewater.

2. Land Treatment Practices - This element addresses evaluation and implementation of appropriate conservation practices on sites proposed for land application of manure and wastewater from an AFO.
3. Nutrient Management - This element addresses the requirements for land application of all nutrients and organic by-products (e.g., animal manure, wastewater, commercial fertilizers, crop residues, legume credits, irrigation water, etc.) that must be evaluated and documented for each Conservation Management Unit (CMU).
4. Record Keeping - It is imperative that records are kept to effectively document and demonstrate implementation activities associated with CNMPs. This element lists documentation requirements associated with developing and implementing a CNMP.
5. Feed Management - Feed management activities may be used to reduce the nutrient content of manure, resulting in less land being required to utilize the nutrient contents of the manure. This element addresses feed management acitivites as a possible opportunity in the CNMP planning process.
6. Other Utilization Options – This element addresses other utilization options associated with animal manure and wastewater as alternatives to traditional operational methods.

Public Comments

NRCS posted the draft Technical Guidance in the Federal Register for a 120 day public comment period. A total of 62 separate letters were received, representing comments from the following general groups: Federal, State, and Local Units of Government (19 letters); Agribusiness/Commodity Groups (20 letters); Environmental Groups (12 letters); University/Professional Society (6 letters); Individuals (5 letters).

The key comments/concerns raised through the public comment process can be capsulated by the following:

- The draft Technical Guidance does not address all of the environmental and public health concerns associated with animal feeding operations. (i.e., air quality, odors, pathogens, heavy metals, etc.)
- Lack of coordination between the NRCS CNMP process and the NPDES CAFO permit process will result in regulatory confusion and uncertainty for AFO/CAFOs.
- The draft Technical Guidance does not contain specific enough procedures or criteria to allow someone other than an NRCS employee to develop a CNMP.
- CNMP Process – Include a description of how USDA envisions that public and private professionals will be trained and certified in accordance with NRCS' National CNMP Certification Policy. Clarification of whom can develop and/or certify a CNMP – many groups would like clarification regarding the credentials of entities involved in developing and certifying a CNMP.
- The CNMP should be the tool used to achieve the requirements of a CAFO-NPDES permit, and therefore, should be subject to public review as other industry NPDES permits.

- Confidentiality of records is of utmost importance. It is not clear from the proposed draft Technical Guidance who will have control, and access to, the records that are proposed to be a part of a CNMP.

- In states having nutrient management certification programs, any Federal employee who will be developing or approving nutrient management plans for federal programs must be certified by that state program.
- Neither the USEPA nor the NRCS appear to understand the potential ramifications of feed management. Feed management is the first and logical place to start when evaluating manure management.

The key changes anticipated to the Technical Guidance to address the comments/concerns raised through the public comment process can be capsulated by the following:

- NRCS recognizes that the Technical Guidance does not establish criteria to address resource concerns other than water quality. Many issues related to air quality, odors, pathogens, and heavy metals are not fully understood, and only a few conservation practices addressing these problems have been developed by NRCS. However, a Comprehensive Nutrient Management Planning (CNMP) research needs assessment has been developed and is being addressed by the Partnership Management Team (Agricultural Research Service; Cooperative State Research, Education, and Extension Service; NRCS). NRCS, working with these other USDA agencies and professional organizations and societies, is developing a series of fact sheets that address these other resource issues. It is anticipated these fact sheets will be available in Fall of 2000.
- NRCS and EPA have worked closely over the last 8 months to ensure the compatibility of the NRCS Technical Guidance with EPA's Guidance Manual and NPDES Example Permit for CAFOs. The intent of both agencies was to ensure that a CNMP, whether developed for a voluntary USDA program or to meet NPDES regulatory requirements provided the same level of resource protection.
- More clarity has been added to the Technical Guidance to distinguish between requirements and considerations when addressing criteria for each of the six elements in developing a CNMP. In the criteria for the elements, direct reference to standards, specific policy locations, and sections or chapters of technical references to enhance the functionality of the Technical Guidance. Also, key conservation practice standards (i.e., Nutrient Management (Code 590)), policy (i.e., 190-GM, Nutrient Management), an example of RMS planning alternatives development, and informational fact sheets (i.e., Pathogens, Feed Management, Air Quality) will be included.
- A new section has been added that explains the CNMP certification issue, how certification programs will be established, and the types of certifications that will be needed to address CNMP development and implementation.

Certification

Providing conservation planning and other technical assistance to AFO/CAFO operators through voluntary incentive based programs and/or to meet regulatory requirements presents a potentially tremendous workload. NRCS traditionally has been the primary provider of conservation planning and related technical assistance to agricultural producers and others, having the ability to make and carry out natural resource management decisions. In an effort to build capacity to meet this potential workload, NRCS is establishing a process for certifying "approved sources" of conservation assistance. An individual who is appropriately certified through a USDA recognized certification organization is an "approved source." These individuals are then referred to as "certified specialists."

Certification organizations can come from the private or public sectors. Private consultants, employees of agribusiness, and others who hold appropriate certifications through an approved

independent certification organization or state licensing agency can be approved as "certified specialists." Employees of natural resource conservation agencies, departments, or other entities organized under local, State, or Federal law who have planning and technical assistance functions as part of their assigned responsibilities also can be approved as "certified specialists." Other non-commercial sources, as determined by the NRCS state conservationist, can also be approved.

Individuals can be recognized as an approved source for conservation planning by obtaining a "certified conservation planner" designation, or as an approved source of technical assistance for developing components of a conservation plan by obtaining a "certified specialist" designation. An individual that is capable of developing a complete CNMP would require a "certified conservation planner" designation. To develop components (specific elements) of a CNMP would require a "certified specialist" designation.

In the development of a CNMP, as a minimum, the elements Manure and Wastewater Handling and Storage, Land Treatment Practices, and Nutrient Management must be developed by "certified specialists". Because of the diversity and complexity of specific skills associated with each element of the CNMP, it is anticipated most individuals will pursue "certification" for only one of the elements. Therefore, to achieve a CNMP may require the interaction of three separate "certified specialists", each addressing only one of the three elements.

It is envisioned that a "certified conservation planner", assisting the AFO/CAFO owner/operator, would facilitate the CNMP development process, with "certified specialists" developing the more detailed specifics associated with the element they are "certified" to produce. It is anticipated that NRCS will continue its traditional role as the leader in conservation planning assistance by filling the role of "certified conservation planner" associated with CNMP development and implementation, within its available resources on a State-by-State basis.

Watershed Science Institute, Stefanie Aschmann

Described below are two Watershed Science Institute products under development.

Watershed Condition Indicators

The watershed indicator selection tool, a prototype of which can be accessed through the WSSI web site (http://www.wcc.nrcs.usda.gov/watershed), is being developed in response to a national request for training on watershed health indicators. Many site-specific indicators of environmental health exist, but these are not always easily aggregated to a watershed scale. The Institute staff determined that new indicators were needed to meet NRCS requirements. It also became clear that the usefulness of any particular indicator depended largely on the questions to be answered, so for the prototype tool, we provided indicators that will help prioritize watersheds based on resource issues of concern.

The tool is designed to help the planner identify appropriate screening indicators for specific resource issues. The prototype currently contains descriptions and examples of indicators for two resource concerns: 1) **soil pollutants and contaminants** 2) **sustainable food and fiber production**. The indicators include:

1) EPA listed contaminated sites (NPL listed sites)

2) Phosphorus source-to-sink ratio
3) HEL cover/no-till ratio
4) Off-site vulnerability index
5) Soil quality impairment rating
6) Survey of accelerated erosion features

Comments on the tool and/or individual indicators are welcomed. We anticipate that new indicators will be continually added as they are developed, and modified as we learn more about how they function at scales larger than the field scale.

Watershed Phosphorus Modeling

Watershed Nutrient Ecosystem Dynamics-Phosphorus (WEND-P) is a modeling process designed to help land use planners and policy makers make better informed decisions about the long-term potential for phosphorus export from individual watersheds and ways to minimize this export. WEND-P is based on the concept of mass balance, that is, the phosphorus that enters the watershed minus the phosphorus that leaves the watershed is equal to the phosphorus stored in the watershed. WEND-P examines the input and output of phosphorus from all major land uses within the watershed and from the watershed itself. How the watershed is defined and how land uses are defined will impact the model construction.

WEND-P is constructed using a commercial modeling software program called STELLA (High Performance Systems). With STELLA the user diagrams the relationships to be modeled and inputs the algorithms to describe these relationships. The software then transparently writes the code that creates the model.

WEND can be used to estimate maximum carrying capacities relative to an established target or threshold P loading goal, assess the effects of changing permitting programs and nutrient management regulations on P export, and assist in the formulation of TMDL's. It differs from the P index in a number of respects. First, WEND-P is designed to look at long-term (20-40 year) trends in P export while the P index looks at off-site P movement potential at a given point in time. The P index is a qualitative, site-specific index, i.e., it evaluates the general potential for P loss from a single field. In contrast, WEND is process based, but not geographically based. It does not predict P movement from any location within the watershed, but from the watershed as a whole.

WEND-P inputs are general averages. Results are general predictions and should not be interpreted as actual P loss values. Both WEND-P and the P index consider the importance of management on P export potential, but WEND-P evaluates the impact of management strategies (such as erosion reduction strategies) rather than individual practices (such as terraces) on P movement potential. The P index can help a landowner determine where to most safely land apply P today. WEND-P can help the regional planner determine how much P can be safely land applied in a watershed over an extended time frame.

The soils information needed for WEND includes an assessment of the dominant or modal soils for each of the land uses in the watershed and a description of their characteristics. If no one soil

dominates the land use, it may be necessary to estimate the properties of an average soil that may not actually correspond to any soil in the watershed. WEND models will also benefit from development of P adsorption isotherms for the dominant soils (particularly the agricultural soils) in the watershed, and a reliable conversion of soil test phosphorus levels to total phosphorus for the dominant soils.

QUESTION RESPONSE:
Question: How can resource soil scientists be better informed about the watershed health tools and technology transfer from the Watershed Science Institute?
Answer: The best place to go for information about the Watershed Science Institute technology is the WSSI web site: http://www.wcc.nrcs.usda.gov/watershed. Most of the products that the Institute has published can be accessed through the web site. The Watershed Health Indicators tool, which is a work in progress, can be accessed through the web site under PRODUCTS. The web site also houses the Institute's Business Plan, which contains our ongoing and proposed projects. A plan is underway to revise the web site to make it more readable and accessible. We hope to soon have a direct link to pending products.

Robert Weatherspoon, Project Leader – Soil Scientist, Live Oak, Florida

Middle Suwannee River Area Watershed

Size and Location

The Middle Suwannee River Area Watershed is divided into four parts: North East (MSRA), South East (MSRA), North West and South West (MSRA). This MSRA watershed is located in north central Florida approximately halfway between the cities of Jacksonville and Tallahassee. The watershed is a tributary to the Suwannee River which originates in the Okefenokee swamp in Georgia and flows through the Florida peninsula for 245 miles before it empties into the Gulf of Mexico.

The Watershed is approximately 52 miles long and 32 miles wide and contains approximately 500,000 acres. Topography in the area ranges from nearly level to gently rolling. Elevations range from about 40 feet to about 200 feet above mean sea level.

Geology

The hydrogeology of the area is karstic with closed basins, stream to sink drainage, numerous springs, and an unconfined aquifer with a high degree of recharge potential overlain by sandy, predominantly well-drained soils. There are few defined streams and numerous small sinkholes in the area. Surface runoff is minimal with most of the flow of the Suwannee River coming from the ground water.

Soils

The uplands in the watershed are mostly well drained to excessively drained soils on broad ridges. They have rapidly permeable sandy layers to depths of more than 80 inches

or they have loamy subsoils below a depth of about 40 inches. Therefore, they have severe limitations for most cultivated crops due to doughtiness and the rapid leaching of plant nutrients. They have a medium to high potential for pesticide leaching to ground water and a low potential pesticide runoff to surface water. They also have a medium to high or high potential for nitrogen leaching to ground water and a low potential for phosphorus runoff to surface water.

Middle Suwannee River Area Watershed problems and concerns
Ground water quality

In localized areas nitrate have been found in drinking water that exceeds safe drinking water standards. All major sources of nitrate nitrogen leaching to the aquifer in the watershed have been evaluated and was determined that livestock and poultry operations are the only significant, uncontrolled sources of contamination.

Technical Assistance

One soil scientist and a soil scientist ground penetrating radar specialist have been assigned to the Middle Suwannee River Watershed project. The major responsibility is to assist the engineers and planners with soil information that will aid in the planning of a new or the expansion an existing dairy or poultry operation. The soil information that is needed for the planning is soil texture, depth to the seasonal high water table, depth to bedrock and the coating of the sand grains. The USDA-NRCS engineers and planners use this data to design an economical waste management system and a nutrient management plan..

Currently there are seven dairies in the project where soils information is being used to design a waste management system. In addition to water table data and bedrock information, a detailed map of coated vs. uncoated Quartzipsamments is important in the MRSA watershed. These determinations are made in the field using soil color, the feel of the sand, and the experience of the soil scientist, compared to laboratory data from similar soils. If the soil in the planned area has uncoated sand grains (<5% silt plus clay) the amount of waste applied will be based on phosphorous use and the removal by planned cropping system. If the soil analysis is determined to be coated sand grains the waste application will be based on the nitrogen use of the planned cropping system.

Soil information can assist planners and engineers in designing waste management systems and plans that can assist in maintaining a clean environment.

CONSERVATION PROGRAMS Panel 2
Interpretations & Technical Soil Services

(Mac Henning (Bob Nielsen) (CRP), Cheryl Simmons (LESA Coor), Dave Lightle, (NSSC),Ray Sinclair (NSSC)) CRP

Conservation Reserve Program (CRP) Malcolm Henning, NHQ Conservation Operations and Bob Neilsen, NSSC

1. Will we be able to update frozen HEL lists with new K factors derived from new data?

Response: The Soil Survey Division may also want to respond to this question. Programs interpretation is that new "K" values for highly erodible lands (HEL) determinations for conservation compliance and or CRP is not allowed. The new data may be used for other uses other than HEL determinations for conservation compliance and or CRP.

2. Is populating data for CRP still a high priority?

Response: Again, the March 30th request did not come from Program's. The Soil Survey Division may want to respond to this question.

3. CRP and Frozen HEL Lists – What are the plans to use current soils data instead of frozen data.

Response: NRCS has no plans. However, to use the current soils data would require a change in FSA policy. There is talk, Congress may consider a legislative fix to this issue in the next farm bill.

4. CRP and Frozen HEL Lists – The frozen HEL soil map unit lists and factor values, dated January 1, 1990, are used to make erodibility determinations. CRP is authorized through 2002. Now is the time to lobby for wording change in the Code of Federal Regulations. Let's try to include wording that captures the soil values or factors in NASIS. If a NASIS warehouse is established, the data can be dumped prior to a signup and used for determining CRP's HEL land eligibility category. This program can help us work towards a consistent product. We should use the best data we have available.

Response: We all in National Headquarters agree, but we must understand that NRCS must follow its own policy until the policy is changed.

5. There are soil surveys correlated since 1990. It is time to append the 1/1/90 list as outlined in the National Food Security Act Manual. Has anyone done that?

Response: Programs interprets the National Food Security Act Manual, (Section 511.13) as saying, under no circumstances will highly erodible map units (January 1, 1990 criteria), of an older soil survey have their classification changed. Section 511.13 relates specifically to Soil Surveys in progress.

6. It should be dictated that CRP soil rental rates are derived from NASIS generated indices. If they need to be developed by some physiographic region, so be it. Stand-alone indices should be outlawed. They cause major problems at an administrative boundary. If needed, the index could represent 70% of the soil rental rate and a 30% influence could come from the county average rental rate.

Response: FSA Management and CRP program manager is responsible for addressing this policy concern.

7. The FSA information that we are populating in NASIS requests that the R factor be entered. There are two R-values, one for USLE (Frozen HEL) and a different one for RUSLE2 used with planning. Which one should be entered?

Response: The Soil Survey Division may also need to respond to this question, but for CRP and HEL determinations, the USLE R-values is mandatory. For determining the "before" and "after" soil loss information, the RUSLE2 "R" values may be used, where States have the approval to use RUSLE.

8. One of the biggest concerns here is the CRP and frozen HEL lists. This has been a big issue in the western part of the state where wind erosion is a big problem. Updated information shows that most of the soil surface textures are coarser that what was originally mapped, making these soils eligible for CRP. But under current rules, they are not. This frozen list rule has also really slowed, or nearly killed any interest in updating soil surveys. If the new soil information cannot be used to correct the HEL list, or improve it, why would any conservation district spend money on updating soil surveys?

Response: Soil Surveys are not used exclusively for CRP eligibility determinations. CRP eligibility determination is only one of the many uses of soil surveys.

9. Are we going to continue with the March 30 date for getting all of the data into NASIS for an automated CRP sign-up process? There isn't going to be a signup then Management so when are we going to see a retraction by NHQ for all this database work that needs to be done?

Response: The March 30th request did not come from Program's.

Farmland Protection and Community Planning, *Cheryl Simmons, LESA and FPPA Coordinator*

In October 2000, the Farmland Protection and Community Planning Division (FPCP) was created within the Natural Resources Conservation Service (NRCS). The responsibilities assigned to this Division include implementing the Farmland Protection Policy Act, managing the Farmland Protection Program, and assisting local communities with land use planning and urban conservation.

In an effort to implement the Farmland Protection Policy Act (FPPA) more effectively, FPCP has met with Federal agencies involved in activities that may lead to potential land conversion; revised FPPA policy to clarify Federal agency responsibilities; and has begun to design training for both NRCS field staff and participating Federal agencies. Working with the Soil Survey Division and Iowa State University, we've started computerizing soils lists and a portion of the Act's Land Evaluation Site Assessment (LESA) system for field office use. We are also working with local communities to conduct a pilot to computerize important farmland maps. We believe these maps will not only assist NRCS offices with FPPA requirements, but will also aid communities in smart growth planning.

As it relates to community planning, FPCP is piloting an effort to create tools to help communities with local planning efforts. These tools include will be packaged for local use. Important farmland maps, GIS data layers containing soils information, and natural resource inventories are also included in this effort. In selected urban counties, NRCS is conducting a survey to assess technical needs.

In June, USDA will award $17.5 million in Farmland Protection Program (FPP) funds to state, Tribal and local governments' farmland protection programs. With the passage of the Agricultural Risk Protection Act of 2000, non-governmental organizations also will be eligible for FPP funds, enabling more states and entities to participate. To date, we have received applications from 27 states requesting over $116,000,000 in Federal funds.

Technical soil services are critical in farmland protection and community planning. We want to be active partners in elevating soils in and out of NRCS.

CLARIFICATION OF LESA GOAL

50 New or Updated LESA systems.

> **New – LE and SA portions completed and placed on the State Conservationist's list. (The LESA has been adopted for use by a local jurisdiction.)**
>
> Updated – The LE or SA portions have been updated this year. LE may need to be updated if the soil survey has been updated to add or change/correlate appropriate soils for use in the model.

Reporting – Report the existing completed LESA systems on the State Conservationist's list and the year placed on the list. Also, report any LESA systems being updated with the date completed and new LESA systems with the date the system was placed on the State Conservationist's list. Report the LE portion as it is completed for each county.

RUSLE2 and WEPS1.0, Dave Lightle, Agronomist, NSSC

Both RUSLE2 and WEPS1.0 will obtain soils data from the "ToolKit" download from NASIS which will be placed on the field office computer. The model developers will write necessary code to allow the models to access this NASIS download. The major point of this discussion was to provide information about the time table and soils data needs for implementation of RUSLE2 and WEPS 1.0 by NRCS Field Offices by the end of FY 2002. Train the trainer sessions will be held late this summer and into the fall. Field office training will begin after January 1, 2002.

A PowerPoint presentation was used to illustrate various screens in the new RUSLE2 model and which data elements would come from NASIS and which would not. The frozen list of factor values maintained in the FOTG is not appropriate for use with the new models nor is some of the data stored in NASIS supporting these frozen lists.

I illustrated how the soils choice lists would look at the Field office level in the RUSLE model. It will be similar in WEPS with map unit symbols and components listed. The recommendation is to include only components comprising at least 20% of the map unit. Users would choose the appropriate component(s) representing the area being modeled.

Climate information including the RUSLE "R" factor comes from climate data supplied by the National Water and Climate Center and not from the R factor stored in NASIS. I recommend this data element be dropped from NASIS. Using an R factor map, I illustrated the difficulty of assigning R factors to map units mapped all over a county when no single R factor exists in a county. R is not a soil property but rather it is climate data associated with the climate database. If the only reason we have R in NASIS is to provide USLE data to FSA for electronic signups then we need to tell FSA that R should come from the official climate database not from NASIS. This issue needs to be resolved nationally between the Soils, Ecological Sciences and Programs Divisions as it relates to maintaining the frozen list and also providing up to date soils and climate data for conservation planning using the new models. This should be an action register item.

The erodibility factor used with RUSLE is Kf, which excludes rock fragments on the surface. Such surface fragments are treated as mulch cover in other parts of the model and thus should not be included in K. We should populate the surface rock fragments field in NASIS since planners may use this information when using the models.

I presented several profile screens in RUSLE2 and discussed the slope grade and length parameters. Currently the RUSLE model requires the user to enter slope grade and

length. It is not automatically populated in RUSLE as a default when a component is selected. There was recent discussion with the model developers about having these pop in as defaults but that met with resistance from the model developers who wanted time to research the problems associated with using slope lengths from NASIS.

Comments were offered by Rick Bigler regarding the NASIS data elements needed by the new erosion models and the timetable for populating these. A document was reviewed during a later session on this. At least one county in each state needs to be populated by July 1, 2001 for use during training sessions. The rest will be needed not later than March 1, 2002.
Questions and answers ensued with the point being made that efforts need to be made at the national level to eliminate the need to maintain the frozen list of USLE and WEQ factors for future Farm Bills. This also should be an action register item.

National Cartographic and Geospatial Center (NCGC) Activities and Priorities

Tommie L. Parham, Director, NCGC, NRCS, Fort Worth, Texas

This presentation is focused on changes at NCGC. NCGC is re-oriented to its' original customer service mission area and is striving to partner with states, regions, and national staffs in efforts to acquire, integrate, and deliver geospatial data, GIS, GPS, remote sensing, NRI, SSURGO & digital map finishing initiatives products and services.

Products, Services, and Vision:

- Our Data Model **(Vision)** is "build once and use many times"
- The NRCS "tool box" needs and assortment of tools (GPS, data collection & mapping, information, and communication)
- NCGC Annual Summary FY2000 and CD
- GPS Requirements and Recommendations Report October 2000
- Formation of NCGC GIS Training Team
- NCGC GIS Implementation – Introduction to ARCView 3.2 GIS Version 1.1 CD Three modules to assist states as they develop their deployment (training) strategies for delivery of CST and GIS.
- NCGC is one of **"only"** six official FGDC Clearinghouse Sites in North Amer.
- Deliver Seamless DRGs to States by Zones
- Partnering with ITC on Lighthouse Product and Services Delivery from NCGC
- Its hard to reach a CD/DVD World with 8-track tape technology
- McCaleb's to coordinate a "Summit" on Soil Survey CD Publications
- NCGC is working with ITC on refinement of Web Mapping Tools
- Piloting Automation of Farmland Protection Maps w/NHQ
- We must find and implement new ways of delivering our products; Soil Survey Publications (hardcopy, CD-ROMs, and Web-based), SSURGO, and NASIS.
- Implementation of Tracking System to Replace Carto-19

Priorities:

Assist States with Acquisition of Imagery, Transition from Analog Technology to Digital, Deliver DOQs for SSURGO Initiative, Revise SSURGO Eval. and Archive AMLs, Re-engineer Digital Map Finishing to Utilize DOQs as Backdrop, Deliver DOQ CD's, Soil CD Publication Summit – Spring FY01, Imagery to Imagery Registration, Acquire Imagery for FY2001 Continuous Inventory, and Support Use of GPS

Acquire, Integrate, and Deliver Geospatial Data, Deliver BPR GIS Layers for USDA GIS Strategy, Support Customer Service Toolkit Implementation,
Support NCGC Interactive Tracking, Deliver Helpdesk Services, Deliver USDA GIS Training Materials, GIS Implementation at Service Centers, and Coordinate Intro to Digital Remote Sensing and Data Collection Training via WWW (Web).

Support 2001 NRI Data Collection, Deliver '97 NRI on CD's, and Update Inventory Tools

Ag Handbook 296 Update Project

Jim R. Fortner, NSSC

Status:

Memo sent out about a year ago announcing the project and timeline for completion

Team established at NSSC to coordinate the project

Jim Fortner, soil scientist, chair
Sharon Waltman, soil scientist
Stan Anderson, editor
Johnny Patterson, forester
Dave Lightle, agronomist
Curtis Talbot, range mgmt. specialist
Bob Engel, soil scientist
Lyle Steffen, geologist

New format for description of MLRAs and LRRs identified

State offices and MLRA offices have designated those MLRAs to be significantly modified

Preliminary line work for these modifications has largely been submitted

NSSC team in process of drafting revised descriptions for those MLRAs that will not be significantly modified

- 1997 NRI summaries of landuse/landcover distribution by MLRA has been received and to be used in updated descriptions
- State and MLRA offices are working on refining MLRA boundaries and writing descriptions for those to be significantly modified

Timeline:

Due to several reasons causing delays, a revised timeline has been established as follows. These dates have been coordinated with similarly revised dates for the companion STATSGO update project. In general, the dates have been delayed about 6 months to 1 year.

1	MO/SO to submit their preliminary MLRA line work to NSSC (digitally preferred) for use in summarizing characteristics	4/15/2001
2	NSSC to send draft updated MLRA descriptions of existing MLRAs to MO/SO for review	6/30/2001
3	MO/SO to return reviewed/edited descriptions to NSSC	11/30/2001
Coordinate new map work w/STATSGO update		
4	MO/SO completed revisions to MLRA map line work and descriptions of new MLRAs to NSSC	3/31/2002
5	NSSC to assemble all material into draft of updated Ag Handbook 296 and distribute for review	6/30/2002
6	Review comments due to NSSC	9/30/2002
7	Final copy ready for publication	12/31/2002

STATSGO Update Target Dates from NATIONAL INSTRUCTION NO. 430-302 Second Edition – Revisited

Sharon Waltman, NSSC

§ 302.4 Target dates.

Tasks may be accomplished and submitted prior to target dates to expedite the program.

What	When	Who	Rev Date
PRE-CONVERSION			
1. Assign 1:250,000-scale quadrangles to MO for quality assurance	Dec. 1999	Team	Complete
2. Correlate map units and edit maps to remove state lines for a seamless national layer for the 48 contiguous states	Mar. 2000	Team/MO	Complete
3. Establish ownership of each map unit	Mar. 2000	Team	Complete
4. Develop a national legend for for all STATSGO map units	Mar. 2000	Team/MO	Complete
5. Inventory states for original USGS mylar topographic base maps and registered punched overlays	Apr. 2000	MO	Complete
6. Order compilation materials from NCGC- includes USGS 1:250,000-scale topographic base maps and punched overlays	Apr. 2000	MO	Complete
7. Inventory states and order ratioed general soil maps from NCGC	Apr. 2000	MO	Complete
8. Establish global conversion rules and exception handling	Apr. 2000	Team/ITC	Complete
CONVERSION			
14. Create conversion component link tables for water tables, pans, CEC, and rubbly surface textures	Jul. 2000	MO/States	Complete

11. Revise and fix conversion software	May 2000	ITC	Jun. 2001
12. Revise taxonomic classification of components in Soil Classification file	Jun. 2000	Team/MO/ Soil Tax Staff	Jul. 2001
15. Convert tabular data	Jul. 2000	ITC	Jul. 2001
9. Develop NASIS/STATSGO component matching query and process	May 2000	Fortner Egley	Aug. 2001
10. Revise metadata to comply with current FGDC standard (may be ISO standard)	May 2000	Team	Sep. 2001
POST-CONVERSION			
16. Complete STATSGO/NASIS component update	May 2001	MO/States	May 2002
17. Complete digital map data revision	Jun. 2001	MO	May 2002
18. Revise metadata content	Jun. 2001	MO	May 2002
19. Final review and validation of taxonomic class of STATSGO components against Second Ed. Ag Handbook 436, 1999 standard	Jul. 2001	MO/States	Jun.2002
20. Create MLRA/NASIS overlap table from revised Ag Handbook 296 map	Aug. 2001	Team	Jul. 2002
21. Complete quality review and assurance – includes correlation of of joins and tabular data to map data	Aug. 2001	MO/States	Jul. 2002
21.5 National correlation of tabular and map data		NSSC	Aug. 2002
22. Submit certification letter for the Digital General Soil Map of U.S.	Sep. 2001	MO	Aug. 2002
23. Archive the Digital General Soil Map of U.S. at NCGC	Sep. 2001	MO	Sep. 2002

Implementing the Recommendations of the National Drought Policy Commission

Jon Werner, Engineering Division

National Drought Policy Act
July 1998
Public Law 105-199
The law directed the Commission to "conduct a thorough study and submit a report on national drought policy."
National Drought Policy Report
May 2000 - 5 separate / interrelated goals
"Goal 2: Improve collaboration among scientists and managers to enhance the effectiveness of observation networks, monitoring, prediction, information delivery, and applied research and to foster public understanding of and preparedness for drought"
Interim National Drought Council
National Drought Policy Report
Specific Recommendations
2.1 The President should appropriately direct and Congress, as necessary, should authorize and fund a viable plan to maintain, modernize, expand, and coordinate a system of observation networks that meets the needs of the public at large. Priority should be placed on filling the gaps on tribal lands and in rural America. Examples of critical observation networks include:
a) Dept. of Commerce, NWS, Coop. Observer (COOP) Program
Hydrometeorological Network
NWS Coop stations that measure and report daily temperature and precipitation (12,000 w/5,000 full climatic stations)
Approximately 750 ASOS sites in US
Proposed Climate Reference Network (CRN)
250 automated stations
Preserve longtime record

b) U.S. Dept. of Agriculture, Soil Climate Analysis (SCAN) and Snow pack Telemetry (SNOTEL) networks
Location of 662 SNOTEL stations in the Western U.S.
Location of 42 Soil Climate Analysis Network (SCAN) sites in 37 states.
Proposed SNOTEL expansion for the West (total of 1500sites)
c) U.S. Forest Service, Remote Automated Weather Station (RAWS) Network
Location of 1,200 FS RAWS sites in the Western U.S.
d)U.S. Geological Survey, Stream gaging and Groundwater Network
Proposed National Stream flow Information Program (NSIP)

1. 5300 stations
2. Intensive data collection - droughts/floods
3. Q information interpreted - regional / national scale
4. New products (frequency, uncertainty bounds attached)
5. New development and research

e) Other regional observation networks
Location of 1,012 Mesonet stations currently operating (1999)

2.2 The President should appropriately direct and Congress, as necessary, should authorize and fund continuation of the U.S. Drought Monitor and exploration of opportunities for its improvement and expansion.

2.3 The President should appropriately direct and Congress, as necessary, should authorize and fund continuation of Drought Predictions/Outlooks and development of techniques to improve their accuracy and frequency.

2.4 The President should appropriately direct and Congress, as necessary, should authorize and fund a comprehensive information gateway (possibly through expansion of the National Drought Mitigation Center's website or other similar approaches) to provide users with free and open access to observation network data and drought monitoring, prediction, impact, assessment, preparedness, and mitigation measures.

2.5 The President should direct the appropriate federal agencies to develop an effective drought information delivery system such as the Unified Climate Access Network (UCAN) to communicate drought conditions and impacts to decision makers at the federal, regional, state, tribal, and local levels and to the private sector and general public.

2.6 The President should direct appropriate federal agencies to expand technology transfer of water conservation strategies and innovative water supply techniques as part of drought preparedness programs.

2.7 The President should direct and Congress should continue to adequately fund existing and future drought-related research. Existing competitive research grant programs should give high priority to drought.

2.8 The President should direct and Congress should fund completion of the soil survey on all lands, with special and immediate emphasis on tribal lands. As the Western Drought Coordination Council advised the Commission, basic weather, water, soil moisture, mountain snow amount, and climate observations are the foundation of the monitoring and assessment activity that alerts the nation to impending drought.

USDA NRCS Soil Climate Program

R. F. Paetzold

The NRCS Soil Climate Team manages 17 separate long-term projects with 135 active monitoring stations in 34 states, Puerto Rico, the U.S. Virgin Islands, Antarctica, China, and Mongolia. In addition the team conducts short-term soil temperature studies in 25 states.

Each long-term station monitors soil temperature, soil moisture, and air temperature. In wet soils, soil redox potential is measured and in soils with high water tables, water level is monitored. Many of the stations also monitor atmospheric variables such as relative humidity, wind speed and direction, precipitation, and solar radiation. Snow is measured at some stations. Additional measurements may be made for research activities.

The team manages three types of projects: 1) service projects for NRCS to answer specific questions for a state or NHQ; 2) research projects in cooperation with other agencies, universities, and other research organizations; and 3) networks with standard measurements and daily posting of the data to the WCC web site. The primary network is SCAN (Soil Climate Analysis Network). A complete array of atmospheric variables are monitored in addition to soil water content and soil temperature at five standard depths to one meter (soil temperature is also measured at two meters). Data from SCAN stations are collected daily via meteor burst communications and posted to the WCC web site. It is anticipated that eventually all of the projects will fall under the SCAN umbrella.

Many of the service projects collect information specifically for the National Cooperative Soil Survey program. Other service projects are designed to answer questions about wet and hydric soils. One project was initiated to give information on water relations in dense and friable till soils. Most of the research projects are designed to provide information for Global Climate Change activities. Since the very cold areas around the poles and on the Tibet Plateau are thought to be most sensitive to global change, many of the research projects are located in these areas. The NRCS has the northern most soil climate station in the United States, at Barrow, Alaska. The NRCS also maintains the southern most soil climate station in the world, near Scott Base, Antarctica. In addition, the NRCS has some of the highest soil climate stations in the world, between 17,000 and 18,000 feet on the Tibet Plateau in China.

The NRCS Soil Climate team is lead by Ron Paetzold, NSSC, Lincoln, NE. Members are: Jon Werner, NHQ, Washington, D.C.; Deb Harms and Henry Mount, NSSC, Lincoln, NE; Ken Hubbard, Director, High Plains Regional Climate Center, Lincoln, NE; Garry Schaefer, Don Huffman, Rose Loehr, and Barbara Miller, NWCC, Portland, OR; Denice Shilling, NRCS, Great Falls, MT; and Jane Thurman, ARS, Beltsville, MD. Two electronics technicians, Bill Woolcock and Ron Bush, NWCC, help with station maintenance. Denice is part

time and does quality control for the SCAN project. Rose and Barbara are computer specialists and take care of data processing and posting to the web of SCAN data. All of the folks in Portland are working primarily with SNOTEL in addition to their soil climate work. Henry Mount is responsible for all of the short-term soil climate projects with activities in 25 states.

The team installs and maintains soil climate stations. Complete soil characterization is performed at each site. In addition, the team collects, processes, and stores the data. Much of the data are available through the Internet on the WCC web site.

Last year, NRCS received more than $160K from ARS and various other groups to support its soil climate monitoring efforts. In addition NRCS has received from its various cooperators a great deal of indirect support in the form of instrumentation, logistics, and labor.

There is tremendous demand for the NRCS soil climate data. The users range from school children doing science projects to NASA scientists calibrating remote sensing instrumentation. It is amazing to see the variety of users and uses of the data. In addition to direct benefits to the NRCS, the Soil Climate Program adds to the prestige of the agency and provides it favorable publicity.

Soil Quality and Technical Soil Services

Craig Ditzler – Director, Soil Quality Institute

The motto of the Soil Survey Division is "Helping People Understand Soils". The concept of soil quality, which centers on the capacity of soils to provide important functions in the environment, should be an integral part of any technical soil services program. The soil survey tells us about the basic properties of our soils, how they formed, where they are located, and the uses they are best suited to. Soil Quality concepts integrate physical, chemical, and biological properties of soils as indicators of soil quality. It gives us a framework to think about how soil management either degrades, maintains, or enhances the soil's ability to function.

The Soil Quality Institute has developed products and tools that can be used in a technical soil services program.

Outreach and education:

- Soil Information Sheets covering 15 basic topics under the general categories of soil quality indicators and soil quality resource concerns.
- This summer we plan to release a new series of 10 "Rangeland Soil Quality Information Sheets.
- Soil Biology Primer. This booklet describes the soil food web and contains individual chapters on types of soil organisms. It is in great demand from science teachers. It can be ordered through the Soil & Water Conservation Society.
- Another soil biology publication is the "Introduction to Microbiotic Crusts".
- We also have a 12 page compilation of soil biology resources on our web site (http://www.statlab.iastate.edu/survey/SQI/).

Assessment of soil quality in the field:

- The Soil Quality Test Kit Guide describes how to use an on-farm test kit developed by ARS to obtain quantitative measures for several soil quality indicators. It is available commercially or you can follow our instructions to build your own. We provide step-by-step test procedure instructions and interpretive information. We have a Spanish language version of the kit guide available for download on our website.
- The Soil Quality Card Design Guide describes a process of working with local farmers to identify qualitative indicators that they can use to observe and monitor soil quality on their farms. It can also be used with garden groups.

Soil quality management.

- Agronomy Technical Notes – Currently we have notes covering 10 topics in this series.
- Urban Technical Notes – Three notes have been released covering urban soil quality issues.
- Minnesota Soil Management Series – Produced in cooperation with the Minnesota Extension Service and the Minnesota Institute for Sustainable Agriculture. It consists

of 5 booklets covering Soil Management, Compaction, Manure Management, Organic Matter, and Soil Biology.
- We have just released the publication "Guidelines for Soil Quality Assessment in Conservation Planning". This document is intended for field office use. It incorporates soil quality assessment and management into the 9 steps of conservation planning utilized by field office employees.

These products and tools can be used to help soil scientists develop their technical soil services program. Some examples include:

- Topics and information for articles for newsletters,
- Conducting workshops for conservationists, agronomists, foresters, farmers, etc.
- Continuing education opportunities for certified professionals.
- K-12 educational programs.
- Ag. field days and demonstrations.
- Documenting soil management effects on benchmark soils

Soil Quality—Considerations in Soil Survey and a Cornerstone of Technical Soil Service Activities

Mike Sucik, SSS, Des Moines, IA

This a brief (15 minute) presentation on how Iowa NRCS is utilizing the Soil Quality Tool Kit in Soil Survey and Technical Soil Services.

The kit can be utilized to measure various soil properties and can demonstrate differences in soil chemical, physical, and biological properties with regard to management. Iowa will be populating a use-dependent data base for the Iowa County, Iowa update soil survey using the kit and other sources.

The kit is being used to train non-soil scientists how to recognize and measure soil properties and will be part of an established training protocol for certifying conservation planners.

Other way Iowa is using the Soil Quality Tool Kit is in nutrient management by measuring nitrate levels in soil profiles and in water quality by evaluating water infiltration and aggregate stability on soils adjacent to water bodies.

The kit is a very good educational tool and is being used to teach elementary and secondary school students about soils, soil properties, and the relation of soil to other environmental considerations.

Ecological Sites Inventory

Curtis Talbot, Rangeland Mgt. Specialist
National Soil Survey Center, Lincoln, NE

An ecological site is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. Ecological sites encompass what used to be known as range sites and woodland suitability groups. Ecological sites are differentiated by significant differences in the species that are in the characteristic plant community, significant differences in the relative proportion of species in the characteristic plant community, and significant differences in the total annual production of the characteristic plant community. The ecological site description is composed of the following sections: Physiographic Features, Climate Features, Water Features, Soil Features, Plant Communities, Site Interpretations, and Supporting Information. The biggest change in ecological sites, in recent years is the replacement of climatic climax theory with the state and transition model. The use of states and transitions are a better way to model the dynamic performance of ecological sites, where a state is a recognizable, relatively stable and resilient complex whose attributes include its abiotic and biotic components. A transition is a trajectory of system change between two states caused by natural events, management actions, or a combination of both. Somewhere along this trajectory, is a threshold which is a boundary between two states that, when crossed, creates an impossible return to the original state, at least on a practical time scale without significant inputs.

By policy, ecological site descriptions are part of the Field Office Technical Guide. The national inventory of ecological site descriptions is currently housed in the Ecological Site Information System, or ESIS. The Ecological Site Description (ESD) application provides the capability to produce automated ecological site descriptions from the data stored in its database. ESD is the official repository for all data associated with the development of forestland and rangeland ecological site descriptions by the Natural Resources Conservation Service. Another place you'll find reference to the ecological sites is in NASIS, specifically in the Component Potential Ecosystem table.

Ecological site descriptions and forage suitability groups are critical components of the Field Office Technical Guide. Strengthening our use of the art and science of sound rangeland and woodland technology now will enable us to continue our efforts as an agency into the future. The needs of our customers have changed and new technology has been developed. This data allows our customers to apply conservation to the land with the very best information available and provides compelling reasons to do the right thing. Our field employees need to be experts in rangeland and woodland technology. We must capture the institutional memory and knowledge of our employees who are nearing retirement. The ecological site descriptions will be invaluable to new employees. Ecological site descriptions will be a powerful tool to enable both our technical staffs and producers to make better land management decisions. This must be incorporated into our strategy, vision, and performance management plans. The agency's heart and soul of technology and its development is our employees. There will never be a substitute for the

men and women at the field level who know plant communities, soils, and animal interfaces. Our employees should have this technology and bring the strength and skill for which our agency is recognized.

All of NRCS' technical employees have something to contribute to the development of these descriptions. For most states, the leadership for ecological site descriptions will be a state rangeland specialist, or state grassland specialist. However, without the involvement of others the site description will be shallow. Many of the abiotic components of an ecological site are those which are captured or described as part of soil survey. Hence, the partnership with soil survey should be one of the strongest in the ecological site description plan.

*Much of this presentation and many of the slides were provided by George Peacock, Grazing Lands Technology Institute, USDA-Natural Resources Conservation Service.

Publications

Panel Discussion on Publication Issues with Stan Anderson, Jimmy Todd, and Mike Kortum

Processes and Alternatives in the Soil Survey Publications

Currently there are approximately 35-40 soil surveys ready to be printed with current funding at $1 million level able to complete 25-30 of these.

There are about 75 additional jobs with text in the National Production Staff and maps in the National Cartographic and Geospatial Staff. Currently the text or manuscript lends itself to a digital product but most of the maps that have been map finished do not. The maps would need to have a hardcopy made, scanned, and this file placed on a CD. This file of the map would not be interactive and likely appear much like other historical CD soil survey products. Most new map finished surveys are now using the Digital Ortho Quadrangle as a base enabling the maps to become an interactive digital product.

We are in a transition from the traditional publication to a digital product. The best method to complete the approximately 75 jobs is either print them as in the past or accept a non-interactive, historical CD product.

Emphasis on lowering the number of hardcopies needed with a target of 100 copies or less. Change the target product to a CD or web based product rather than a book. Recommend forming a team with editors, cartographers, and GIS specialists to develop a standard format to produce all soil surveys on a CD and/or web product. Potential members should represent a cross section of the country and have some experience producing these products.

Suggested some test products be produced and distributed to MLRA Leaders using an output device Jimmy Todd has experimented with that will handle the large (E size, 22" X 27") maps needed for soil surveys. Cost is close to $250,000 or an annual lease would be $60,000. This would expedite the print on demand use of maps. This will be a cost-effective alternative if hardcopy quantity needs drop under 100 copies and the quality level is adequate.

Panel Participant
Printing Specialist
NCG, Ft. Worth, TX
Mike Kortum

Example:

World Wide Web Based HTML Soil Survey Reports

MO-2 -- Pacific Southwest MLRA Soil Survey Region, Davis CA

Background:

Soil survey information is one of the most valuable products the NRCS has to offer. Traditionally, soil survey information has been distributed in the form of printed reports. The high demand for soil survey reports in California has exhausted our supplies. We currently have 23 out-of-print soil surveys reports or with supplies of less than 50 copies. In recent history it has been difficult to obtain national funding for reprinting surveys. The last soil survey printed through such funds cost $22,000 for 500 copies. A cost-effective method of delivering soil survey information is the World Wide Web (WWW). We have also found that this format has distinct advantages over traditional printed copies.

Features of the Web based soil survey:

-- HTML format (not PDF!).
-- On-screen viewable soils maps.
-- Downloadable soils maps in various scales and resolution (size matters).
-- Tables from certified NASIS data (old tables from original published reports can be also be included for reference if desired).
-- GIS thematic maps not included in the original publication can be added .
-- Web based product can be downloaded to CD for distribution.
-- Photographs can be added.
-- Internet links to references can be included
-- Can be dynamic (that is, they can be updated and enhanced without reprinting the entire survey.
-- soils information is available world wide to millions of people.

Methodology:

A.. Maps:.

1)Scanning of hard copy published maps were scanned and enhanced using Adobe PhotoShop. This proved labor intensive, but it is the only alternative if electronic maps are not available.

2) Maps created from certified SSURGO data using ArcView. Soil lines were overlaid on USGS Topographic maps or digital imagery.

B. Text:

1) Text was converted from PageMaker files.
2) Without electronic copies available, text was scanned and reformatted.

C. Database tables:

1) NASIS generated data reports and interpretations.
2) For an older survey, the field office requested that the original published tables be scanned and also be available for viewing.

Advantages:
-- interactive navigating through the report is greatly enhanced over PDF or hard copy information.
-- users are most familiar with web browsers than most other software and therefore this format is easier for most users.
-- CDs operate exactly as the web access and can be distributed.
-- lower cost than printing published reports.
-- information could be updated and re-published quickly.
-- users can use downloaded maps for many applications.
-- looks great.
-- economies of scale -- same format and framework can be reused for all surveys saving several months work.

Disadvantages:
-- Scanned map method is very labor intensive. Creation of maps from SSURGO is less work intense but still takes time.
-- requires a higher degree of expertise than PDF (knowledge of html and Java script programming and knowledge of Adobe PhotoShop or similar software).
-- Requires a separate server than the usual state office site because of the large storage requirements

Available for review:-- http://www.ca.nrcs.usda.gov/mlra/index.html then click on your choice of:Mendocino Co., CA, West; Napa County, CA;; Stanislaus County, Western Part

NRCS Information Technology Center (ITC)

Ken Harward, ITC, Ft. Collins, CO

Background

The NRCS Information Technology Center (ITC) is located at the Natural Resources Research Center (NRRC) in Fort Collins, Colorado. The ITC is an operational support unit for agency mission critical national information systems. The ITC develops and maintains information technology (IT) architectures, national software applications, and large enterprise databases. It supports the acquisition and deployment of technology upgrades. The center develops and maintains standards and procedures for software development, testing, and certification to assure consistency and compatibility across agency information systems. ITC personnel provide operational support for security and telecommunications. The National Help Desk provides a full range of IT technical support to NRCS field, state, and regional offices.

Mission

The mission of the ITC is to provide the information technology infrastructure and application information systems to support the delivery of NRCS programs and services.

Functions

- Technical Architectures
- System Requirements and Design
- Application Programming
- Web Site Development
- Software and Hardware Testing and Certification
- Data Modeling, Data Administration
- Database Administration
- IT Acquisition Support
- IT Implementation Support
- System Administration
- Telecommunications Strategy & Operation
- Security Operations
- Life Cycle Management
- Geographical Information Systems (GIS)
- National Help Desk

Resources

Staff: The ITC is a multidisciplinary staff of NRCS and contract personnel including the following professional areas:

- Computer Specialists
- Computer Scientists
- Computer Engineers
- Telecommunications Specialists

- GIS Specialists
- Soil Conservationists
- Soil Scientists
- Engineers
- IT Contracting Officers (Management Services Division on-site staff)
- Administrative Specialists (National Business Management Center on-site staff)

Partnerships: The ITC works closely with the following agencies:
- USDA Field Service Center Partners (Farm Service Agency and Rural Development)
- USDA/Agricultural Research Service
- US Forest Service
- US Fish and Wildlife Service
- US Geological Survey

Major Information Systems

Program Delivery
The Customer Service Toolkit, released in May 2000 and built with ArcView desktop GIS, Microsoft Outlook, and Office 97, is deployed in approximately 1800 NRCS offices in more than 35 states. The software enables field conservationists to quickly produce conservation plans, resource maps, soil interpretations, and contract support documents.

The Wetlands Toolkit, released in November 2000 as a set of tools that extends ArcView desktop GIS, facilitates making wetland determinations.

Natural Resource Data Warehouse
The Resource Data Gateway, deployed in January 2001, provides a web "storefront" for ordering geospatial and tabular datasets, available to agency users and the public. Current focus is on supplying data for the two toolkits referred to above.

The Web Soil Data Viewer, currently in beta testing, produces on-line soil interpretations for cropland, forestland, urban development, soil properties, and other uses.

Both the Gateway and Viewer were developed as the Lighthouse Project, a joint effort of the ITC, Microsoft, Compaq, and ESRI. The Lighthouse architecture includes navigation, map display, map printing, catalog, and other common services. Other on-line natural resource applications are being developed using the architecture.

Integrated Accountability System (IAS)
The Performance and Results Measurement System (PRMS), brought on-line in October 1998, manages performance records entered by NRCS employees for measures that help determine the effectiveness of agency programs. Each working day between 5,000 and 20,000 records are entered, processed through a data quality gate, stored in a transaction database, and in the evening summary data is processed into a warehouse. Agency managers, congressional staffers, and the public can view on-line reports of progress by NRCS as of the previous day.

IAS includes several other components including on-line cost accounting (TCAS/ACRES, 1999), Workload Analysis (WLA, 2000), Workforce Planning (2000), and RC&D Program Tracking (1999). The system integrates all automated strategic planning and program tracking processes. The system is built with Java, Java Script, Jbuilder, ASP, Visual Basic, NetDynamics, Cold Fusion, MapObjects, and other tools.

National Soil Information System (NASIS)
Initially developed and released in the early nineties, NASIS provides agency soil scientists with the means to manage data for approximately 3000 soil surveys. The next release of NASIS (version 5.0) will involve the migration of the system to the Fort Collins service center agency Web Farm. This version also will provide a NASIS export for SSURGO geospatial data, critical data needed for the Toolkits and Natural Resource Data Warehouse. The system also includes applications for managing data associated with soil survey fieldwork (PEDON) and laboratory studies (LIMS).

National Plant, Animal, and Ecological Site Information System
This system contains the award-winning PLANTS database, which has been on-line since 1994. This application provides plant taxonomy, plant names, threatened and endangered status, wetland indicator status, plant characteristics, and weeds. The system also includes the Interagency Taxonomic Information System (ITIS), a Hammer Award recipient in 1997. The Ecological Site application (ESIS) manages plant community and range site data. VegSpec provides users a convenient and quick way to select plants for conservation practices and develop planting guides.

Information Technology Infrastructure

Common Computing Environment
The ITC Infrastructure Team Leader provides leadership to the USDA service center agency

Common Computing Environment (CCE). Recent activities include the acquisition of 2070 workstations and laptops, 2120 licenses of desktop GIS in summer 2000, and 2723 communication servers in late 2000, with remote system administration capability. By the end of 2001, all service center workstations on the local area network will be CCE compliant.

Electronic Access
This service center modernization effort is establishing web farms at Fort Collins, Kansas City, and St. Louis, including a standard security architecture and server capacity for hosting agency web applications and databases. The ITC is migrating the production systems it manages to the web farm during 2001. The Fort Collins web farm hosts the agency's On-Line Directives application, and an increasing number of NRCS web sites, including the NRCS Home Page.

Telecommunications
The hub and spoke frame relay network was completed in 2000, providing a basic level of dedicated connectivity to service centers. The ITC (working with counterparts in partner agencies) is providing primary support and leadership to evaluating high bandwidth solutions through a pilot in New Mexico during 2001, including terrestrial VPN, private IP network, satellite, and mobile satellite. USDA will use the results of the piloting effort to implement a solution during 2002.

Data Management
The ITC Information Systems Team Leader provides leadership to the USDA service center agency Data Management Team. In 2000, the team developed a data architecture for the partner agencies primary data centers, including the NRCS National Cartographic and Geospatial Center in Fort Worth and the FSA Aerial Photography Field Office (APFO) in Salt Lake City. The Data Management Team also supports the Office Information Profile (OIP) database, and associated databases that track hardware, software, and telecommunications deployments.

For More Information

Visit the ITC web site: http://www.itc.nrcs.usda.gov

Or contact:
Director, Information Technology Center
USDA NRCS
2150 Centre Avenue, Building A
Fort Collins, CO 80526
Phone: 970-295-5455
Fax: 970-295-5540

NASIS/SSURGO PANEL

Fort Collins Activity, Ken Harward, NASIS Project Manager

There are currently 5 major information systems funded for development and/or maintenance work at the Information Technology Center in Fort Collins. These systems are:

1. Program Delivery Area
    - Customer Service Toolkit (CST)
    - Soil Data Viewer (SDV)
    - Wetlands Toolkit
2. Natural Resource Data Warehouse
    - Lighthouse Project
    - Resource Data Gateway
    - Web Soil Data Viewer
3. Integrated Accountability System (IAS)
    - Performance and Results Measurement System (PRMS)
    - On-line Cost Accounting (TCAS/ACRES)
    - Workload Analysis (WLA)
    - Workforce Planning
    - RC&D Program Tracking
4. National Soil Information System (NASIS)
    - NASIS release 5.0 (central server)
    - Windows Pedon
    - Laboratory Information Management System (LIMS)
5. National Plant, Animal, and Ecological Site Information System
    - PLANTS
    - Interagency Taxonomic Information System (ITIS)
    - Ecological Site application (ESIS)
    - VegSpec

Other activities in which ITC either has a leadership role or major involvement include:

- Common Computing Environment (CCE)
- Electronic Access Infrastructure (EAI – Service Center agency web farms)
- Telecommunications Strategy & Operation
- Data Management (standards development for Service Center agencies)
- Technical Architectures
- System Requirements and Design
- Application Programming
- Web Site Development
- Software and Hardware Testing and Certification (including CCE certification)
- Data Modeling, Data Administration
- Database Administration
- IT Acquisition Support
- IT Implementation Support

- System Administration
- Security Operations
- Life Cycle Management
- Geographical Information Systems (GIS)
- National Help Desk

SSURGO & Map Finishing-Ken Lubich, National Soil Survey Digitizing and Digital and Map Finishing Coordinator

Responses to questions:

- Who has the final say on quality, and who really has responsibility for what?

See Part 647 NSHB on Responsibilities. The MO is responsible for quality assurance, those doing the various steps are responsible for quality control of those steps (state, DU). If issues can't be resolved between business units they should be taken to the Soil Survey Digitizing Coordinator

- Map finishing - should digitizing roads and streams be done by digitizing units and/or map finishing centers? After all they have the hardware, software and expertise to complete the task. States have been encouraged to not do these functions.

  States are free to do these steps or pay someone else to do them. The Digitizing Units and Digital Map Finishing Sites are encouraged to work with States and if possible assist with this work on a cost for services bases.

- When are states realistically going to send new NASIS downloads to digitizing centers for re-certifications?

  Some feel they are ready now. The pressure will be on to get the data in the Field Offices and the Digitizing Units will do all they can to keep up with workload.

- Map Finishing - what to do when soils, roads, streams and names are all on top of each other I narrow valleys at 1:24000?

  Leave some off?

- MF Centers should be using the DOQ's during their process.

  They are doing that now, we also need to make sure the SSURGO data is reviewed closely to the DOQ's before DMF, not just to the scan overlays. On screen review recommended.

- What are the current costs to the states for getting new surveys certified?

  A funding workbook is available by email request or by FTP. See Ken Lubich.

- What financial support is available to offset a drain on state budgets?

  None

- What plans are there to update certified SSURGO counties on an as needed basis to respond to new data requirements?

  All currently archived soil surveys need to be re-archived to update the tabular data with the NASIS 5.0 data. The Digitizing Units have been funded for this, and other edits can be made at this time. We hope to complete this task over a 12-month period. Beyond that it is up to the states to pay the Digitizing Units for updating SSURGO certified surveys, if they pay the bill they can determine the schedule.

- No question here, just a comment. We went through several years of trials and tribulations with the SSURGO work until now we have a well-tuned machine that has produced over 1000 certified surveys. Even though digital map finishing is causing a similar level of headaches in its infancy, it too will soon be running wonderfully and we'll have more maps than ever. Hang in there, and trust the folks running the show on this one!

Key points from power point presentation:
SSURGO continues to move a long. In spite of our success with this program we are proceeding at about half the rate and funding originally planned. The digitizing units are generally keeping up with the workload being sent. We need to keep working on compilation and get surveys submitted to the digitizing units. New SSURGO review and archiving AML's will be released in April to accommodate the new data structure in the NASIS 5.0 download. The digitizing units will plan to switch over on April 9th. We will also need to re-archive all the surveys already SSURGO certified.

Good progress is be made with new technology to automate manual compilation. Some programs currently be used successfully are; OrthoMapper™ (stand alone software), MAPLE SYRUP (requires Erdas™ software) and OthoRec a free Arcview™ extension. Out source is another option and Montana has had some good work done by Pixxures Inc.

The Digital Map Finishing (DMF) sites have completed 19 surveys so far this FY; they have another 37 surveys in the works and 10 more at their sites ready to start. We still need to focus on getting survey in to the DMF sites. Some are looking for their next job. Reviews of data during the DMF process is indicating we need to make better use of the digital orthophotography during compilation and digitizing quality control and quality assurance reviews.

Soil Business Area Advisory Group (SBAAG)—Jon Gerken, Chair

This discussion of activities of the Soil Business Area Advisory Group (SBAAG) will briefly touch on its membership, focus, priorities and access to the group.

SBAAG was reactivated in October 1998 by Horace Smith, Director of the Soil Survey Division. The membership has representation from all levels of field staff within the division and from all areas of the country. The membership includes staff from the National Soil Survey Center in Lincoln, NE and Information Technology Center in Ft. Collins, CO. In addition, four advisory positions are included; Maxine Levin from Soil Survey Division, Lyle Kohlmeier, Resource Conservationist from Kansas, Bob Ahrens from the National Soil Survey Center and Mary Thomas, Chief Information Officer for NRCS. We have one liaison position, Bob Dayton an agronomist with Resource Inventory Division in Ames, Iowa.

The group deals with automation needs of the soil business are, with primary focus on NASIS development and implementation. On occasion, items that are the responsibility

of another group, such as Soil Survey Interpretations staff, will be referred to SBAAG. When this occurs, SBAAG doesn't take up the issue, but merely passes it along to the appropriate group. If we can identify who brought the issue to SBAAG, we try to notify that person so they realize that SBAAG will not be dealing with the issue and they should follow up with group the issue was referred to.

The first process SBAAG goes through after identifying issues and discussing the scope of the issue, is to put each issue into a comprehensive listing that is prioritized to identify the order in which issues will be addressed. To date SBAAG has issue lists including 31 issues that have been completed, 50 issues that are currently being worked on, 26 issues that are prioritized for consideration, and 28 issues that have not yet been prioritized. These lists are shown on the web site for SBAAG found at http://nasis.nrcs.usda.gov/sbaag/. These lists should be referenced occasionally to make note of the status of various issues. If the scope of an issue was not well defined to SBAAG, it could be listed as an item that is complete, when the person identifying the issue might still feel more work is needed. Some issues shown on the list might not indicate work or responsibility on the part of SBAAG. They are shown only to indicate that an issue that was brought to SBAAG has been resolved or is being worked on. The actual progress may be the result of some group not represented in the SBAAG membership.

The web page for SBAAG, listed above, lists all of the members in the group, with hot links for e-mail and a link to send a message to all members. In addition, the site includes draft documents that the group has developed, for review and/or comment, and the lists of issues mentioned above. A forum can be accessed from the site to post questions or comments on use of NASIS or activities of the group.

NASIS Comments—Russ Kelsea, NSSC

Tuesday March 20 – NASIS 5.0 Expectations (Soil Data Quality Specialists)

Before we review NASIS 5.0 Expectations, let me discuss some issues related to NASIS development. You have many important issues to discuss this week. To handle these issues effectively, you need to know how NASIS is developed. We follow a structured system development life cycle in which the business experts (all of you and others in soil survey) identify what you need to be able to do and why you need to do those things. You do not have to define how to design the system – we have experts in system design (the folks in Fort Collins) who actually design the systems. Your job is to do what you are good at doing – the business of soil survey. You must be clear about what you need to do and why you need to do those things. You are the experts in soil survey. Let the Fort Collins team do what they are good at doing – logical analysis and system design.

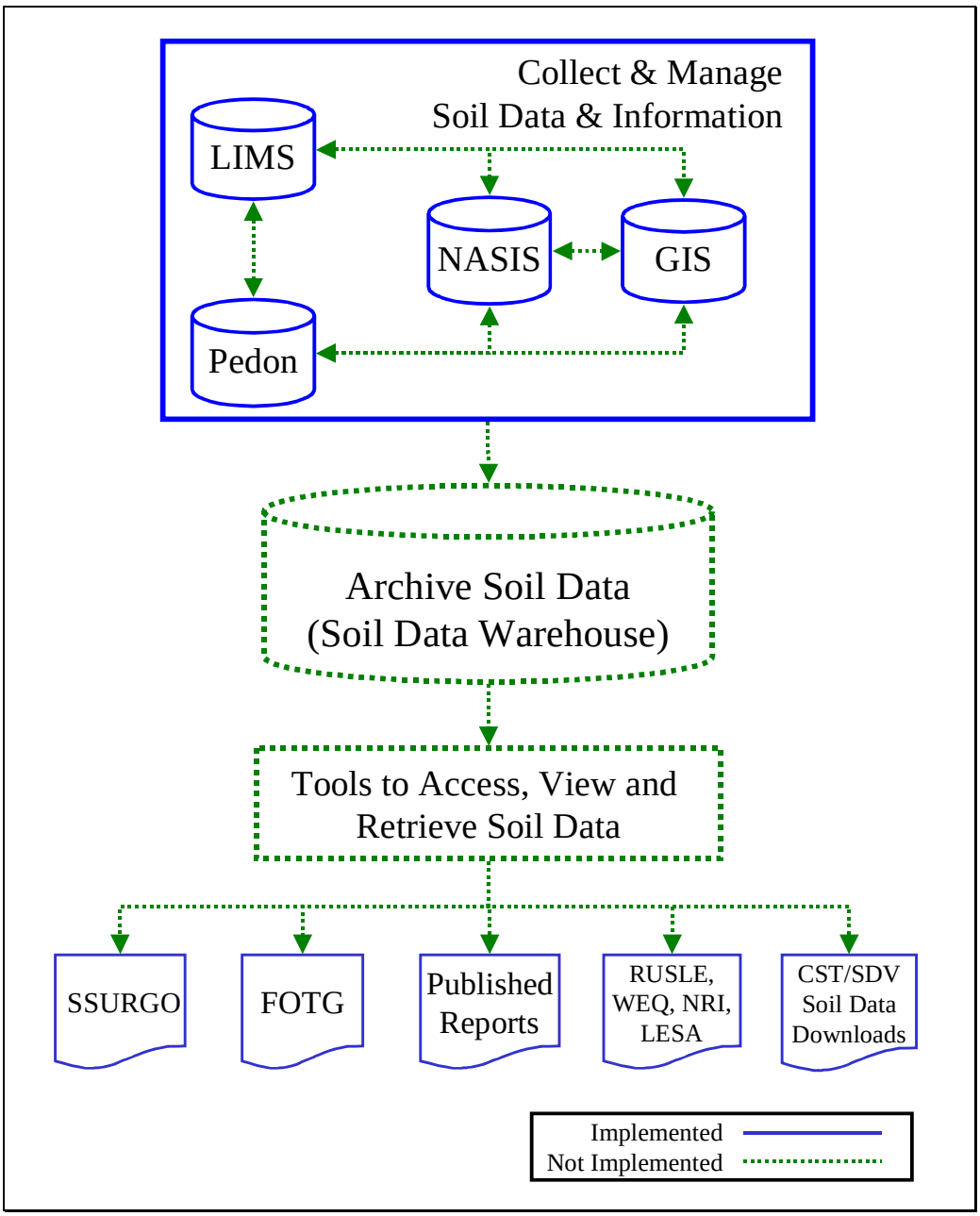
With that background, let's review some NASIS 5.0 Expectations (*see* PowerPoint presentation: SDQS-50Business.ppt).

Wednesday March 21 – Public Distribution/NASIS (State Soil Scientists)

The major development in NASIS 5.0 is the Central Server. For the first time we will actually be able to share data which means that we can join survey data across MO boundaries and that true statewide legends are possible. States like New Jersey have been waiting for this capability for a long time.

NASIS 5.0 also provides high-end tools for the delivery of technical soil services. The interpretation and report writing capabilities in NASIS can satisfy nearly any request for soil survey information. Your resource soil scientists have these tools available in NASIS today. Of course, powerful tools require skill to operate, but when resource soil scientists require powerful information management tools, these tools are available in NASIS.

Finally, a Soil Data Warehouse is under development (*see* diagram). Our vision is that an integrated set of information systems will feed data into a Data Warehouse. The warehouse will hold fixed versions of data and will be the sole-source distribution point of soil survey data to products such as SSURGO, FOTG, Soil Data Viewer and the web access facilities like the Lighthouse Project.


Collect & Manage
Soil Data & Information
LIMS
NASIS
GIS
Pedon
Archive Soil Data
(Soil Data Warehouse)
Tools to Access, View and
Retrieve Soil Data
SSURGO
FOTG
Published
Reports
RUSLE,
WEQ, NRI,
LESA
CST/SDV
Soil Data
Downloads
Implemented
Not Implemented

Rick Bigler, Acting National Leader, Technical Services

The following letter will be sent to State Conservationists next month to clarify state level input of data to NASIS for use of WEPS and RUSLE2.

DRAFT

March 14, 2001

SUBJECT: SOI – Soils Data for Wind Erosion Prediction System (WEPS) and RUSLE2

TO: State Conservationists File Code: 430-12
Directors, Caribbean and Pacific Basin Areas

This letter documents the soils data needed to ensure the timely implementation of WEPS 1.0 and RUSLE2 by the end of calendar year 2002 and other critical dates that need to be met. This information needs to be shared with both your State Soil Scientist and State Agronomist. Successful completion of this project requires the State Soil Scientist and State Agronomist to be working together.

Action Requested by July 1, 2001

A soils data set for one soil survey area needs to be complete and available for use in RUSLE2 and WEPS1.0 by July 1, 2001 for the beginning of the "train-the-trainer" training. If one of the erosion models is not used in your state there is no need to prepare the soil data set for that model.

Action Requested by Early to Middle, 2002

Beginning in early to middle 2002, training and implementation will begin for each Service Center in your state where RUSLE2 and/or WEPS 1.0 will be used. A local soils data set is needed when that training occurs. However, all soils data sets do not need to be completed for every soil survey in your state by early 2002. They need to be completed and available in the Customer Service Toolkit as the training and implementation occurs during the remainder of 2002. The State Soil Scientist working with the State Agronomist can develop an implementation schedule for each of the soils data sets.

Soils Data Requirements

The following paragraphs detail the soil properties that are used in WEPS 1.0 and RUSLE2. These erosion models will use the soils data available within the Customer Service Toolkit. A standard soils data export from the National Soils Information System (NASIS) will provide the data for the Customer Service Toolkit. Many soil properties have low, high, and representative values. These erosion models will use the representative values (rv).

WEPS

Listed below are the soil properties used in WEPS. Some of the soil properties are new and have probably not been populated in your NASIS database.

Soil texture
Component name
Component percent
Number of soil horizons (1)
Thickness of each soil horizon (2)
Slope gradient
Total sand of each soil horizon
Total clay content of each soil horizon
1/3 bar bulk density by horizon, or 1/10 bar where applicable
Oven dry soil bulk density by horizon
Rock fragments by volume in the horizon
Coarse sand by horizon
Medium sand by horizon
Fine sand by horizon
Very fine sand by horizon
Linear Extensibility Percent (LEP)
1/10 bar water by horizon
1/3 bar water by horizon
15 bar water by horizon
Ksat by horizon
Dry soil albedo
Organic matter content by horizon
1:1 H2O pH by horizon, or .01M CaCl2 where applicable
CaCO3 equivalent by horizon
CEC7 by horizon, or ECEC where applicable
Taxonomic order

NOTE: (1) Calculated by the download report
(2) Calculated by the download report using horizon depth to top rv and horizon depth to bottom rv.

The preparation of these data will take staff time on your part. It is difficult to give an estimate of the workload, but we can give you some information that will help you determine the workload in your state. If the soil survey is correlated, published, and certified by your state soil scientist as being complete, you will probably still need to ensure that dry albedo, the sand fractions, oven dry bulk density, and water 15, 1/3, and 1/10 bars are populated.

We have calculations in NASIS that will help provide values for the soil properties mentioned in the preceding paragraph. The names of these calculations are Water Content, Particle Size Estimator, and Albedo Dry. Using the calculations and, possibly the global assign feature in NASIS, the workload will be less than one day for a soil survey of 100 map units. If you are unsure of the quality of the data for the other soil properties, you will need to allot additional time to review the data.

RUSLE2

Listed below are the soil properties used in RUSLE2. Some of the soil properties are new and have probably not been populated in your NASIS database. The list is broken into three subsets:

1) The first subset is a list of soil properties that are required in RUSLE2. The soil database will be the only source of the data.

2) The second subset lists soil properties that may be used in RUSLE2, but if used the soil database will provide default values that the user must either accept or override.
3) The third subset of the list is to help the user of RUSLE2 select the correct soils data or, in the case of T factor, judge the adequacy of the results. They are not actually used in RUSLE2 to calculate soil loss.

Subset 1

Component name
Component percent
Total sand for the surface horizon
Total silt for the surface horizon
Total clay for the surface horizon
Kf (Kw?)
Hydrologic group

Subset 2

Slope gradient
Slope length
Surface fragment cover

Subset 3

Landform
Hillslope profile
T factor

The soil properties in Subset 1 need to be fully populated. Subsets 2 and 3 need to be populated in all soil survey areas in which the State Soil Scientist and State Agronomist determine that the user could benefit from the values.

The preparation of these data will take staff time on your part. Some tools are and will be available to help populate four of the above listed soil properties. They are as follows:

1) **The calculation entitled Particle Size Estimator will provide values for Total Sand and Total Silt.**
2) Guidelines regarding how to correctly populate Slope Length were sent to each State Soil Scientist and MLRA Office Leader in a letter dated January 29, 2001. The subject was "Quality Soils Data – NASIS – Slope Length USLE – Clarification." It was signed by Bob Ahrens.
3) A calculation is being prepared by Bob Grossman to populate surface fragment cover.

Additional information regarding the calculations will be available by the May 1, 2001. If you have any questions, please contact Rick Bigler at the National Soil Survey Center. His telephone number is (402) 437-5879 or email: Rick.Bigler@nssc.nrcs.usda.gov.

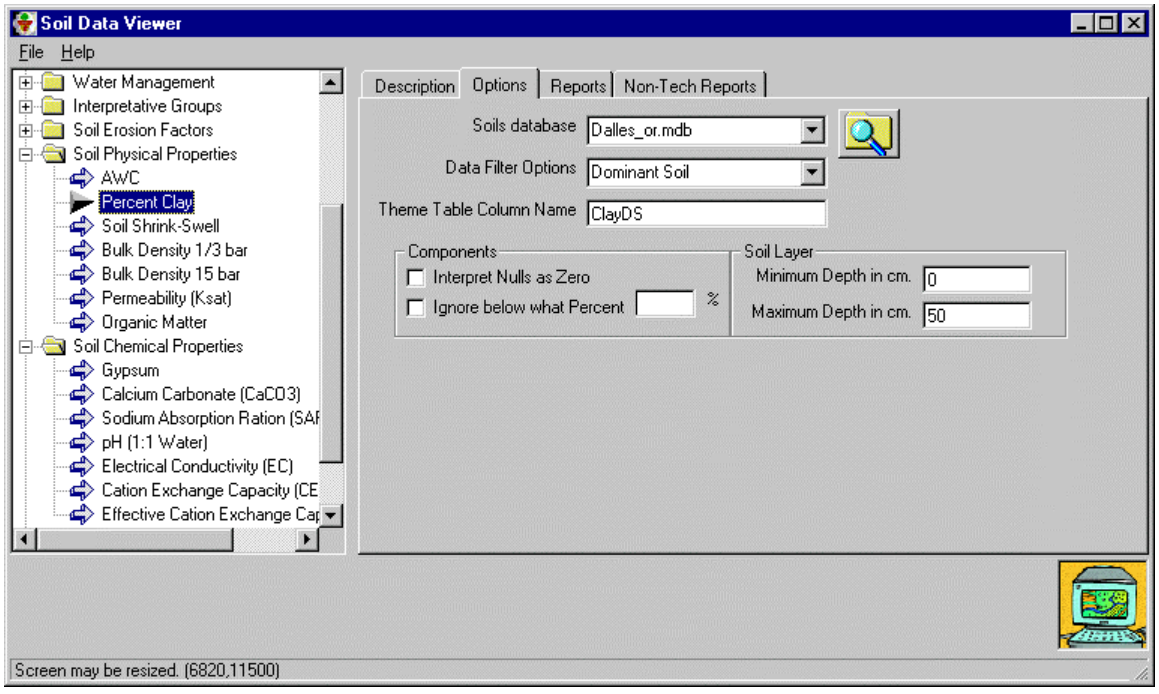
Soil Data Viewer Demonstration, Terry Aho, ITC

This presentation showed the Microsoft Access soil database that supports the new SSURGO version 2 data structure. The MS Access soil database now contains all the classic manuscript reports that can be used for the soil reports of Section II of the FOTG. States that want to migrate from FOCS soil database before SSURGO is ready can deploy the NASIS export – imported into the MS Access soil database template can send the Access database to the FO for use as the major portion of Section II of the FOTG.

Soil Data Viewer version 3.0 is schedule for release with the Customer Service Toolkit 3.0 mid-summer 2001. SDV 3.0 is designed to work with the new SSURGO data structure. SDV 3.0 has the capability to process the MS-Access soil database both in a GIS capacity (with ArcView) and a non-GIS processing of tabular reports. The current Soil Data Viewer 2.0 only works with exports created from NASIS 4.1.1. The next release Soil Data Viewer 3.0 will only work with exports created from NASIS 5.0.

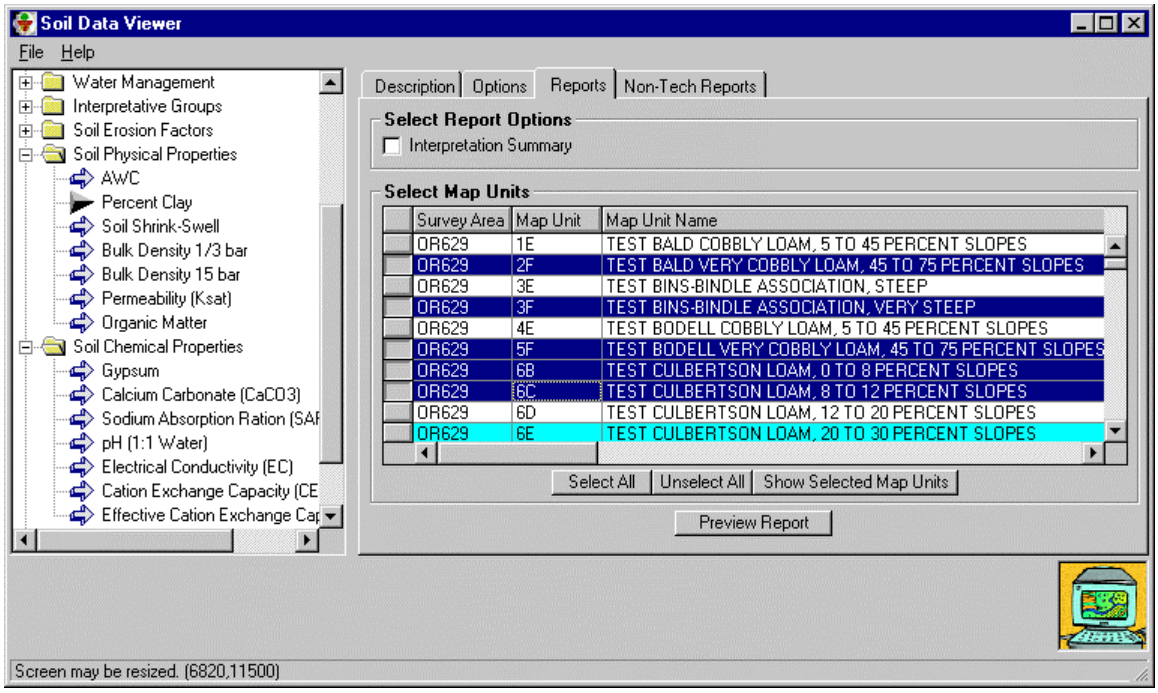
The new SSURGO data structure provides the capability to merge more than one SSURGO data set into a GIS without data conflicts. This will provide users that ability to create wide-area assessments or localized soil themes that cross the boundaries of the SSURGO soil survey.

Soil Data Viewer 3.0 has much more processing power, with the ability to process complex horizon soil physical and chemical properties. User can select a soil property and the depth to process that property based on dominant soil or weighted average.



The above screen the user has selected percent clay for the dominant soil from the surface to 25 inches (50 cm).

The user can also create a tabular report for selected map units that could be included with customer map products. User can select specific map units for reporting. In the non-GIS capacity the tabular report can be used for processing dominant soil, dominant condition, weighted average, most limiting and least limiting. The same processing methods used in the GIS capacity. This provides users at a local field office that ability to process their soil data well before the local survey is certified SSURGO.



Soil Data Viewer 3.0 will also provide the user the ability to access non-technical descriptions in the soil database. The non-technical descriptions as part of Section II of the FOTG can be reported for selected map units providing a custom report to meet the customer needs.

Geophysical Methods within USDA-NRCS: Applications and Interpretations

Jim Doolittle, NRCS, NSSC, email: jdoolittle@fs.fed.us

Geophysical Program Initiative:
Regional Soil Specialists for Geophysical Investigations

New field tools are needed for a new generation of soil scientists. In recent years, three noninvasive geophysical methods, ground-penetrating radar (GPR), electromagnetic induction (EMI), and towed array resistivity units have gained acceptance and have experienced a dramatic expansion of applications within NRCS. These geophysical methods have been used to support soil, agronomic, archaeological, engineering, and geologic site assessments.

Present Disposition

National Soil Survey Center (NSSC)
Complete arrays of EMI and GPR units are maintained by the NSSC in Newtown Square, Pennsylvania. Since its inception, the NSSC has provided ground-penetrating radar and electromagnetic induction field assistance and training to states. Assignments support ongoing programs and are mostly provided at no charge to the states.

Florida
In October 1999, Florida purchased two SIR2000 radar units to replace its aging units. In addition, two 200 MHz antennas were purchased. Units are located in Sebring and Gainesville, Florida

Massachusetts
In December 2000, Massachusetts purchased a SIR2000 radar unit, a 200 MHz antenna, and computer and software to process radar data. The SIR200 system replaced an aging SIR-3 system. The unit is located in West Wareham, Massachusetts.

New York
In August 1999, the NSSC transferred a SIR-8 radar system with a 300 MHz antenna to the Soil Staff in New York. In June 2000, three GPR units were transferred from the US Geological Survey to the Soil Staff in New York. In the fall of 2000, New York purchased a 400 MHz antenna to support ongoing soil and archaeological projects. The GPR units are maintained in Staten Island and Herkimer, New York.

Illinois
With the support of a national initiative, the soil staff in Illinois purchased the Veris Technologies 3100 Soil EC Mapping System. This mobile system integrates GPS, computer-graphics, and resistivity to assess and map apparent conductivity within the upper 36 inches of the soil profile. This system will be used to map the spatial variability of soils and soil properties and to support precision agriculture initiatives. The unit is shared between the Champaign and Carbondale offices.

Other States
Several additional states have purchased EM38 or EM31 to support soil, archaeological, engineering, and ground-water investigations.

Future Geophysical Initiatives: Development of Regional Soil Specialists (Geophysical Investigations)
It is impractical to have specialists in each state. A regional approach is recommend. This approach would enable individual states to have access to geophysical tools, associated technologies, and a specialist(s). It would be more cost effective for NRCS to equip several Major Land Resource Area Offices (MO) with appropriate geophysical tools. The MO would designate soil scientist(s) to operate these tools. A regional approach would decrease unnecessary expenditures by individual states, and would improve the expertise and technological edge of NRCS. A regional approach would also increase the availability of geophysical services to states.

This project would entail the National Soil Survey Division (NSSD) equipping selected MO with appropriate geophysical tools to conduct field investigations. In return for the equipment, the MO would agree to provide a soil scientist(s) for up to twelve weeks to perform geophysical investigations within the home and adjoining states. Specialist(s) would be responsible for geophysical investigations within a restricted geographic area (home state and adjoining states). If the pilot project provides satisfactory results, the project can be repeated in additional MOs.

Rationale For SoLIM (Soil Landscape Inference Model)

Sheryl H. Kunickis, NRCS, Soil Survey Division

Historically, the soil scientist's mental model of how, when, why, and where soils occur on a landscape in a particular location is lost when he or she transfers or retires. This is particularly a sensitive and timely issue as over 50% of the soil survey workforce is eligible to retire within the next few years, resulting in a tremendous loss of information that has been acquired through years of study and observation. In addition, there is not a base of qualified and available soil scientists to fill these positions. SoLIM essentially transfers this carefully developed mental model to a knowledge base that can be stored, improved, and used at any time. The current method of mapping soils involves stereoscopic use and time-consuming manual cartographic work that introduces unintentional errors, depending on the soil scientist's proficiency in these methods. Unfortunately, the science may be lost in the cartographic process. SoLIM replaces these somewhat antiquated and laborious practices through the use of modern GIS procedures and an automated inference scheme.

Traditionally produced soil maps use polygons to delineate soils with the understanding that there are inclusions of similar or dissimilar soils that are not named in the label. This is usually a result of the scale that is used. Inclusions are inherently understood by soil scientists, but this is not always true for the user. As a result, the soil map is considered "wrong" if a soil other than the named soil is found within the polygon. Assuming that the source data is accurate, SoLIM-produced maps distinguish understated variation in environmental conditions and landscape differences that cannot be shown using traditional mapping techniques.

ACCURACY

When field checked, SoLIM-derived soil's maps exhibit a better quality map as compared to a conventional soil map. For example, field sites investigated by soil scientists confirmed that maps produced using SoLIM correctly identified over 80% of the soil series at these sites, while conventional maps correctly identified between 60% to 70%. Differences between the two maps, referred to as mismatches, showed that the SoLIM-derived map was correct 71% of the time, compared to 17% for the conventional map when field examined by a soil scientist (Zhu, et al. 2000).

Software, such as the 3dMapper (http://solim.geography.wisc.edu/solim/software/3dMapper/3dMapper.html) which facilitates landscape visualization and mapping in three dimensions, is used in the SoLIM process. It permits users to superimpose topography with GIS data layers to accurately identify landscape-related features and affords the user the ability to draw lines and polygons. Using 3dMapper, conventional soil maps in a digital format can be examined for line placement, slope verification, and various other use. This is particularly important as many of the users of digital soil maps have access to DEMs and other software and therefore, the ability to check the accuracy of our maps.

Some of the SoLIM products include fuzzy membership maps, detailed raster soil maps, and conventional soil polygon like maps.

- A fuzzy inference engine is used to determine the similarity vector for the soil at each pixel position. As a result, fuzzy membership maps can be produced to exhibit the spatial gradation of soils. Because of limitations in producing conventional soil maps, known transition areas between polygons are recognized as inclusions in the map unit. Soil interpretations do not account for these areas. Fuzzy membership maps identify and recognize the intermediate nature of soils and provide for better interpretations.
- Soil bodies on a detailed raster soil map may be as small as one pixel, which translates to a more detailed soil map compared to a conventional soil map which may be limited by scale. In addition, uncertainty maps can be produced using fuzzy memberships to validate decisions made on naming local soils.
- Conventional soil polygon maps can be produced by "hardening" soil similarity vectors. Just as traditionally made soil maps have inclusions of unnamed soils within the polygon, so do SoLIM polygon maps. However, the composition of *each* individual polygon can be identified and described in detail, providing a more accurate and useful map.

BENEFITS OF SoLIM

SoLIM is a tool that has been developed to assist in producing more accurate and higher quality soil maps. It is not a system that replaces the soil scientist. Instead, it uses the soil scientist's extensive knowledge of the soils in a particular area, combines it with the appropriate DEMs and key environmental information that determine conditions where soils form, and applies the fuzzy inference engine to produce an "inferred" map. Soil scientists verify the map. Discrepancies do not indicate problems with SoLIM, but reflect areas where the soil scientist's concept of the soil model has not been fully captured and needs to be refined. The ability to revise and improve the model as the soil scientist increases his or her knowledge of soil model allows for an immediate update of the soil map.

The magnitude of time and funds required to produce conventional soil maps is not practical in an era where products are in urgent demand, budgets are lean, and the soil science workforce is dwindling. SoLIM affords soil scientists the ability to quickly produce an accurate, detailed soil map in areas where their knowledge base is extensive, providing time for investigating complex landscapes where soil concepts and relationships are unclear. In addition, removing the manual cartographic work that inundates so much of the mapping procedure permits the soil scientist more time in the field. Soil maps produced with SoLIM are in a digital format. Cartographic processes, such as map compilation and digitizing, involved in preparing current soil maps, are eliminated. This results in savings of time and money in producing a soil survey.

NOTE:

This work is being carried out by Dr. A-Axing Zhu (axing@geography.wisc.edu) and Dr. Jim Burt (jburt@geography.wisc.edu) at the University of Wisconsin at Madison in cooperation with the Natural Resources Conservation Service. The project website is located at http://solim.geography.wisc.edu/.

GIS Modeling for Soil Survey: Integrating Ecological and Soil Mapping in Missouri

Fred J. Young, Ph.D.NRCS Soil Scientist, Columbia, MO

In a typical Missouri county, most if not all separations among soil map units are based on differences in either landform or geology. Recent improvements in Digital Elevation Models (DEM), combined with modeling efforts among many individuals, now allow for GIS modeling of landforms. These landform maps can be combined with geology data to create "geo-landform" units, which are being used to create Ecological Land Types (ELTs) as part of an ecological classification system for Missouri (Nigh et. al, 2000). By adding expert soils knowledge to the geo-landform model (e.g., Zhu et. al, 1997), a soil map model can be produced, which can then be tested and refined by field soil scientists. The final product will be internally consistent, as well as fully integrated with ecological units. Although soil scientists and ecologists have communicated and collaborated, actual soils and ELT mapping has proceeded independently. The objective of the study presented here was to examine the relationship between recent soil survey and ELT mapping for an area in the Missouri Ozarks.

Recent soils mapping was digitized and combined with ELT mapping via GIS (see the Power Point show on the companion CD for details). Crosstabulation tables were derived, showing the percentages of ELT units in each soil map unit, and vice versa. Two soil map units were selected for detailed analysis. Results indicate strong soil-ELT correlations, as well as significant discrepancies. For example, one ELT "shoulder" unit extends down steep convex nose slopes, into areas mapped as backslope soil map units. Other examples are given in the power point show.

In conclusion, explicit integration of soil and ELT units seems possible, but will not become reality unless soil scientists and ecologists work together to define the underlying geo-landform units. For example, where exactly are "shoulder" units located on maps? Can we define ELT and/or soil phases to help integrate these products? I remain cautiously optimistic about such an integration. Soils and ELTs may not match up line-for-line, but hopefully units will "nest". There may well be ELT criteria that are not relevant to soil survey purposes, and vice versa, and I do not advocate forcing a soil-ELT fit at any cost. However, we in the National Cooperative Soil Survey need to recognize that other natural resource agencies, including the US Forest Service, are committed to using ecological units in their planning (USDA Forest Service, 1993). The more closely we can integrate soils information with these ecological units, the more likely it is that our soils information will be used.

References

Nigh, T.A., C. Becker, J. Grabner, J. Kabrick and D. Meinert. 2000. An ecological classification system for the Current River Hills subsection. Working Draft Manual. Missouri Department of Conservation. Jefferson City, Mo.

USDA Forest Service. 1993. National hierarchical framework of ecological units. Washington, DC: US Department of Agriculture, ECOMAP. 28pp.

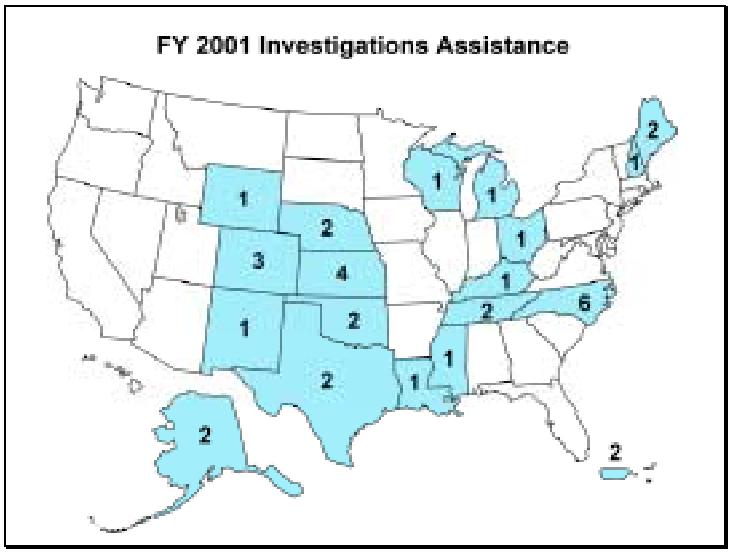
Zhu, A, L. Band, R. Vertessey, and B. Dutton. 1997. Derivation of soil properties using a soil land inference model (SoLIM). Soil Sci. Soc. Am. J. 61:523-533.

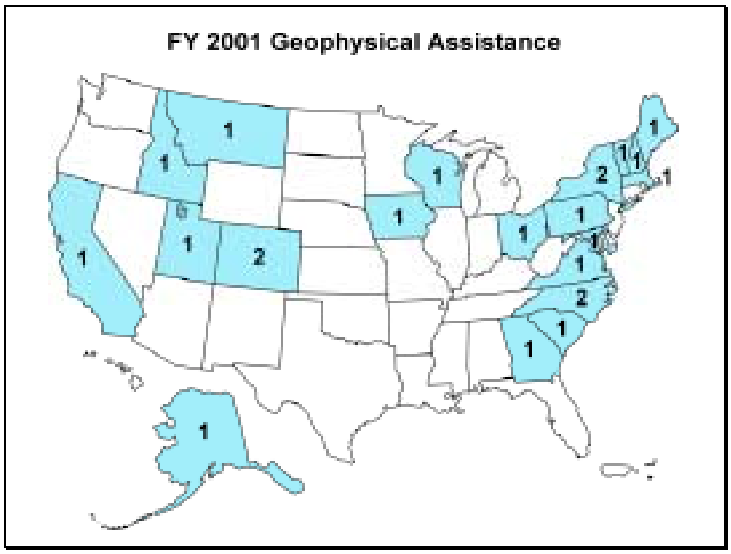
Soil Survey Investigations and Soil-Geomorphic Research

Carolyn Olson, National Leader- Soil Survey Investigations, NSSC

These materials were compiled from the Investigations Staff and the few researchers who are still located on other staffs.

1. Geographic distribution of research and assistance provided by the Investigations Staff FY 2001. Geophysical assistance was separated out and displayed on a separate map.





2. Topical Research. This list is composed of research activities that the researchers are currently involved in. It includes joint projects with NCSS cooperators.

Expert Systems Techniques
- Decision Support Tools
- Predictive Models

Geophysics
- Electromagnetic-Induction Studies (EMI)
- Geophysical Program Initiative
- Ground-Penetrating-Radar Studies (GPR)

LTER Studies
- Involvement in about half of the 24 current LTER sites

Mineralogy and Weathering
- Ashy Soils
- Deconvolution of XRD Information
- Eolian Admixtures to Tephra
- Minerals and Human Health

Nutrient Cycling
- Nitrate, Nitrogen
- Soil Phosphorus

Pedogenesis
- Paralithic Materials and Soil-Water Properties
- Relict Soils and Weathering
- Stable Isotopic Studies
- Vertisols/Paleovertisols

Salinity in Soils
- Irrigation Canal Seepage in Arid and Semiarid Areas

Scaling of Data and Prediction of Soil Properties
- Bulk Density Studies
- Predicting Soil Resistivity
- Rock Fragment Conversions
- Soil Erosivity Predictions
- Use-Dependent and Use-Invariant Data Integration

Soil Biology
- Field Sampling Protocol
- Methods Development
- Microbial Activity and Biomass Analysis

Soil Carbon
- Assessments
- Carbon Storage - No till, CRP

Soil Chemistry
- Major and Trace Element Studies

Soil Classification
- Andisols Properties
- Cascade Range Soils
- Diagnostic Features
- Remotely-sensed inventories

Soil Climate and Hydraulic Properties of Soils
- Hydrologic Indicators
- Small-scale Infiltrometer Comparisons
- Soil Color
- Soil Hydrology and Water Movement through Landscape
- Soil Moisture Studies
- Soil Temperature Studies
- Soil-Water Regimes
- Wet-Soil Monitoring Projects

Soil Geomorphology
- Carolina Bays
- Chihuahuan Desert Study
- Deep Investigations Studies
- Mountainous Terrain Models
- Macon Ridge
- South-central Iowa Terraces
- Southern High Plains - MLRA 77

Soil Health

Urban Soils and Anthropogenic Impacts

3. Announcements:
    a. The pending Memorandum of Agreement with State Geological Surveys and the NRCS.
    b. Request for volunteers to take part in the Task Force to develop regional course curriculum in soil geomorphology.

National Cartographic and Geospatial Center (NCGC), Soil Support Branch

Nathan McCaleb, Branch Manager

The Soils Support Branch supports the National Cooperative Soil Survey by providing assistance in soil map development activities ranging from ordering imagery for field mapping to publishing the maps. Assistance is provided in the areas of acquiring imagery, DOQ acquisition and delivery, SSURGO archiving and support, digital map finishing and support (DMF), soil survey and general soils map preparations. Some assistance is also provided for using the completed soil maps or DOQ for specific interpretation applications. NCGC will host a "Soil Survey on CD and the Web" in order to develop criteria that states can use to produce soil surveys in electronic formats.

Products from the Soil Support Branch are: Photography for Soils Field Mapping; Digital Orthophoto Products; SSURGO database; SSURGO support; DMF; and Soil Map and General Soil Map Preparation.

Reconstructed Virtual Soil-Landscapes

S. Grunwald

1. Introduction

Soil-landscapes are four-dimensional systems where soil and landscape attributes are distributed in three-dimensional (3-D) geographic space and attributes change over time (time: 4^{th} dimension). Currently, geographic information systems (GIS) are still the most common tools to store, analyze, and visualize digital soil and landscape data. However, GIS lack the functionality to handle and display 3-D and 4-D multi-variate and multi-dimensional geo-data. Commonly, two-dimensional (2-D) maps are used to visualize the spatial distribution of soil and landscape patterns (Pennock and Acton, 1989; Osher and Buol, 1998). Other soil-landscape representations use a 2.5-D design, where soil or land use data are draped over a digital elevation model (DEM) (Su et al., 1996; Hogan and Laurent, 1999) to produce a 3-D view. Since this technique describes patterns on 2-D landscape surfaces rather than the spatial distribution of subsurface properties (e.g. soil texture) or volumes (e.g. soil horizons) it fails to address three-dimensional soil-landscape reality. Sketches of soil-landscapes found in Soil Survey Manuals and other publications are mental models showing the generalized distribution and association of Soil Series within landscapes (e.g. representative soil model for Dane County developed by Francis Hole, *In:* Mickelson, 1983). These 3-D sketches are hypothetical models developed without real soil and topographic datasets and without

utilizing geostatistical methods. Numerous research studies have been presented using computer-assisted tomography (CAT), 3-D reconstruction and visualization techniques at micro scale (Heijs et al., 1995; Pereira and FitzPatrick, 1998; Perret et al., 1999). Few studies used reconstruction and 3-D visualization at landscape-scale. For example, the Cooperative Research Center for Landscape Evolution and Mineral Exploration constructed a 3-D regolith model of the Temora study area in Central New South Wales, Australia (CRCLEME, 1999) and a 3-D soil horizon model in a Swiss floodplain was created by Mendonça Santos et al. (2000) using a quadratic finite-element method. Even fewer studies use reconstruction along with virtual reality techniques to portray soil data in 3-D space (Barak and Nater, 2001; Grunwald et al., 2000). According to Rhyne (1997) fully merged or functional transparent integration between geo-data and virtual reality models is still in its infancy.

The objective of this project was to reconstruct real soil-landscapes implementing an object-oriented, multi-dimensional, multi-variate geo-data model to create virtual soil-landscapes at various scales.

2. Methodology

2.1. Multivariate Geo-Data

Virtually any categorical (e.g. soil horizons, drainage classes), discrete (e.g. soil texture) and continuous (e.g. bulk density) morphological and physical soil attributes can be used to create virtual soil-landscape models. Soil data can be either collected in the field using augers, soil cores or subsurface sensors and/or analyzed in the laboratory for specific soil properties. Data assembled in soil information systems such as SSURGO and STASGO can be also used to create virtual soil-landscape models. Topographic data derived from orthophotos, collected with differential global positioning systems (dGPS), or readily available DEM from USGS can be used to describe relief. Geo-referenced soil and topographic data used to reconstruct virtual soil-landscapes have to match in terms of spatial resolution, density, and quality. Detailed information about soil and topographic data used to reconstruct soil-landscapes are accessible at http://www.soils.wisc.edu/soils/3D_SL_models/3Dsoils.html.

2.2. Reconstruction

Reconstruction of real soil-landscapes was implemented utilizing Virtual Reality Modeling Language (VRML) (Ames et al., 1997; Lemay et al., 1999), which is a 3-D object-oriented graphics language. Object-oriented programming models real-world objects with software counterparts and it encapsulates data (attributes) and methods (behavior, communication, and interaction) into objects. Attributes such as geometry (shape, size), content (value), and appearance characterize objects. Objects interact with each other and with their environment, i.e. they exhibit behavior (e.g. algorithm to calculate percolation or erosion), communicate with other objects (e.g. routing of soil particles from one object to an adjacent object), and interact with users (e.g. a mouse click triggers the rotation of an object). Object-oriented programming takes advantage of class relationships; where objects of a certain class share the same characteristics, attribute types, and operations. It also takes advantage of inheritance relationships where newly created classes of objects inherit characteristics of existing classes, yet contain

unique characteristics of their own. These characteristics make object-oriented code portable and increase the flexibility of changing code. Models implemented in VRML are portable across platforms and deliverable across the Internet. Within the VRML-capable browser, the user can interact with objects, e.g. move around these VRML worlds, scale and rotate objects, and view virtual worlds from different viewpoints – e.g. bird's eye view or immersive world view where the user moves through a landscape (Fairbairn and Parsley, 1997; Moore et al., 1999).

Spatial modeling was used to create continuous models describing the spatial distribution of soil and landscape attributes in 3-D geographic space. Constituents used to create virtual soil-landscape models entailed vectors (e.g. irregular volumes representing soil horizons) or voxels (e.g. volume cells representing bulk density or soil water content). Vector-based models were created utilizing 2-D ordinary kriging to create horizontal surfaces and linear interpolation to create vertical surfaces. Voxel-based models were created utilizing 3-D ordinary kriging that is an innovative 3-D geostatistical method interpolating attributes in the horizontal and vertical dimension simultaneously (software: EVS-PRO, Environmental Visualization System; Ctech Development Corporation, Huntington Beach, CA).

3. Results

Reconstructed soil-landscape models are accessible at:
http://www.soils.wisc.edu/soils/3D_SL_models/3Dsoils.html
http://www.crosswinds.net/~sabwql/
http://www.earthit.com.

4. Discussion

VRML facilitates the reconstruction of real soil-landscapes at different scales. These virtual models are (i) multi-dimensional covering 3-D geographic space, (ii) multi-variate based on a variety of different soil attributes, (iii) based on a realistic geo-data model utilizing 2-D and 3-D ordinary kriging, (iv) scalable covering pedon, catena and soil region scale, (v) transferable utilizing an object-oriented approach which can be used to reconstruct models for many different soil-landscapes, and (vi) expandable as new soil and landscape data become available.

Virtual soil-landscape models can be disseminated via the World Wide Web (WWW), which is an inexpensive way to distribute information to a wide variety of users. Users can interact with virtual models and scale, move, and explore objects and access background information about specific soil-landscape characteristics. Model can be utilized for any project in need of soil and landscape data, for example, land use planning, assessment of soil and water quality, farm management, and conservation planning.

Limitations of the presented approach are due to the availability of soil and landscape data used to reconstruct models and complexity and size of soil-landscapes. As a general rule of thumb - "the better the input geo-dataset the better the quality of the reconstructed soil-landscape model". If large soil-landscapes are reconstructed and a large number of constituents are used to reconstruct soil-landscapes, then the loading times of models and interactivity functions in web-browsers slow down.

GIS vendors are developing pseudo virtual reality environments such as ERDAS VirtualGIS and ESRI 3D Analyst extension to ArcView GIS. These are tools to visualize geo-data in 3-D view, however, they are not able to manipulate and visualize multi-dimensional, multi-variate soil and landscape data. The spatial modeling software EVS provides functionality for interpolation and visualization of geo-data, while action streaming is limited to one direction – from the ASCII input geo-dataset to graphical output. Seamless two-dimensional action streaming from the user to the geo-dataset is not available.

5. Outlook

Improved geo-data collection in terms of continuity, sampling density and quality would likewise improve reconstruction of virtual soil-landscapes. For example, subsurface sensors (more information at: www.earthit.com) are useful tools that support soil mapping and the collection of a variety of soil data.

I envision that enhancing VRML functionality utilizing JavaScript and/or Java will permit users to fully query, manipulate, and analyze spatial data in a virtual environment. The vision is to link the geo-dataset to graphical output in such a way that two-dimensional action streaming is enabled. Efforts to develop VRML from an interactive, scientific visualization tool to a virtual, multi-dimensional GIS have just begun.

A prototype 4-D virtual soil-landscape model reproducing dynamic changes of soil and landscape attributes over time is under development. This will enable pedo-dynamic process description occurring at landscape-scale.

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Real-Time Mobile Mapping for High Intensity Soil Surveys

Dan Rooney - Earth Information Technologies, Corp. (Earth IT)

Introduction

The collection and analysis of soil data in an efficient and effective manner at a field or site-specific scale is a scientific and technical challenge. Resource managers will have increasing access to digital high-resolution airborne and spaceborne imagery, topographic data, and landscape attributes.

Soil data has become the limiting factor for high intensity land use and management practices. The mapping of soil at a scale larger than 1:12,000 requires the collection of soil samples, their laboratory analysis, documentation, and association with landscape position for the creation of maps. When a soil core is collected, the number of sections analyzed in the sample limits the vertical resolution of the soil assessment at that location. This vertical spatial error is compounded when attempting to model the spatial distribution and volume of soil properties within a landscape. The field sampling, sample preparation, laboratory analysis, data recording, and spatial association processes add time and cost. Additionally, large volumes of soil profile data must be generated to create spatially significant maps with statistical confidence. Often, additional excursions to the field are necessary to supplement previously collected data. This iterative procedure is time-consuming, expensive, often subjective, and results in maps created with limited data. The amount of data obtained is not sufficient to characterize soil properties and their variability at a field or site-specific scale.

Soil sampling for verification will always be a critical component of any site characterization and environmental monitoring routine. Laboratory-resolution point data will be necessary for site-specific calibrations and to satisfy existing legal requirements. However, a small volume of high-resolution data will not enable the assessment of soil properties at a field scale. Clearly, some of the most pressing needs involve advancements in technology for the assessment, inventory, and monitoring of soil properties. A real-time, mobile soil mapping system is being developed to improve the process of performing high intensity soil surveys and site investigations.

Real-Time Soil Information

The advantage of obtaining soil information in the field is that it can be used to improve the placement of subsequent test locations. A real-time mobile soil mapping data acquisition software is being designed to utilize existing soil databases as well as other ancillary data (ortho-photos, digital elevation models (DEM), yield maps, etc.) as a sampling guide for high intensity site investigations. Sensors can be mounted on multiple push platforms from hydraulic soil coring units to handheld devices. Depth of testing is automatically associated with sensor output and all data is geo-referenced. Hundreds of acres can be intensely mapped in a single day.

Soil Imaging Penetrometer

A Soil Imaging Penetrometer (SIP) was developed to obtain real-time, *in-situ* images of the soil environment. The system utilizes a miniature digital video camera mounted inside a steel housing. A continuous white light-emitting diode (LED) is located in the housing along with a series of mirrors arranged in such a way as to allow the illumination of the soil through an optically transparent sapphire window located in the side of the housing. Sapphire is extremely resistant to abrasion. Light is emitted through the window and illuminates the soil profile as the probe is pushed into the ground. The reflected light is captured enabling the *in-situ* imaging of the terrestrial environment. Focusing optics and high-resolution imaging enable the viewing of features in the range of tens of microns (10^{-6} m). Digital analysis of the images is possible in real-time. Images can be recorded on a small recording device or handheld computer located above ground. One possible application for the SIP is the creation of a "Representative PedonView" for each soil map unit. The digital profile would be available for viewing on the Internet and be used for comparison to image profiles obtained at other locations.

Physical Property Penetrometer

The Physical Property Penetrometer (PPP) is a miniature version of the penetrometer specified to classify soil for geotechnical applications by the American Society of Testing and Materials (ASTM). Currently, near-surface soil investigations are conducted using the penetrometer specified by the American Society of Agricultural Engineers (ASAE). The PPP differs from the ASAE system in that a sleeve friction measurement is obtained in conjunction with tip force.

The ASAE penetrometer measures tip force only. Without a friction sleeve measurement it is impossible to assess whether tip force is increasing due to the presence of a fine or coarse textured soil within the soil horizon. Real-time processing capabilities enable in-field assessments of bulk density and texture and help to facilitate a flexible and efficient soil sampling or mapping routine. A test to 1.4m takes about 70 seconds to perform. Hundreds of locations can be tested in a day. An algorithm developed specifically for the PPP indicates that the PPP system is capable of predicting the soil texture to root mean square (RMS) levels of 11% sand, 9% silt, and 10% clay in real time and *in-situ*.

Multiple-Sensor Soil Mapping

As soil property data is collected and analyzed in near real-time, it can be integrated with data from other test locations within the same field or site. Various sampling and interpolation routines can be applied to create and update the 3-D maps that are produced as a function of the testing procedure. The maps are "slices" of soil properties at user specified depth intervals across the area of investigation. Each slice is a soil property surface (or horizon) and is draped over (under) the site topography. Soil data collected in this way can be easily integrated with other digital resource data using a geographic information system (GIS). When combined, the PPP and SIP enable the delineation of horizons based on both the physical and optical properties of the soil. Other sensors (electromagnetic, ground penetrating radar, soil moisture, and chemical) can be integrated into the data acquisition process as well. The SIP and PPP have been field tested in California, Illinois, and Wisconsin with over 500 hours of use under harsh conditions demonstrating that the hardware is robust and rugged. The tools and processes can be standardized resulting in a less subjective and more effective high intensity soil survey or site investigation procedure. These tools and techniques can be used to assess, inventory, and monitor soil properties and their volumes at a field scale. Examples of in-situ images, digital video clips, and PPP data can be seen on-line at www.earthit.com.

Acknowledgements

Just as with any significant endeavor, the development of these tools and techniques would not be possible without the help of others. I would like to thank John Norman and Frank Scarpace (Univ. of Wisconsin-Madison), Bob McLeese (Illinois Natural Resources Conservation Service), Stephen Lieberman (U.S. Navy), and Marek Dudka, Sabine Grunwald, and Mark Cheyne (Earth Information Technologies, Corp.)

Use of Digital Soil, Topographic, and Land-Use Data to Estimate Potential Runoff-Contributing Areas

Kyle E. Juracek, U.S. Geological Survey

Abstract

Digital soil, topographic, and land-use data was used to estimate potential runoff-contributing areas in Kansas. The results were used to compare 91 selected subbasins representing slope, soil, land-use, and runoff variability across the State. Potential runoff-contributing areas were estimated collectively for the processes of infiltration-excess and saturation-excess overland flow using a set of environmental conditions that represented, in relative terms, very high, high, moderate, low, very low, and extremely low potential for runoff. Various rainfall-intensity and soil-permeability values were used to represent the threshold conditions at which infiltration-excess overland flow may occur.

Antecedent soil-moisture conditions and a topographic wetness index were used to represent the threshold conditions at which saturation-excess overland flow may occur. Land-use patterns were superimposed over the potential runoff-contributing areas for each set of environmental conditions.

Results indicated that the very low potential-runoff conditions provided the best statewide ability to quantitatively distinguish subbasins as having relatively high, moderate, or low potential for runoff on the basis of the percentage of potential runoff-contributing areas within each subbasin. The very low and (or) extremely low potential-runoff conditions provided the best ability to qualitatively compare potential for runoff among areas within individual subbasins. The majority of the subbasins with relatively high potential for runoff are located in the eastern half of the State where soil permeability is generally less and precipitation is typically greater.

The ability to distinguish the subbasins as having relatively high, moderate, or low potential for runoff was possible mostly due to the variability of soil permeability across the State. The spatial distribution of potential contributing areas, in combination with the superimposed land-use patterns, may be used to help identify and prioritize subbasin areas for the implementation of best-management practices to reduce runoff and meet Federally-mandated total maximum daily load requirements.

Soil Survey Laboratory - Laboratory Information Management System

Thomas Reinsch and Dewayne Mays, NSSL, Lincoln, NE

The Natural Resources Conservation Service Soil Survey Laboratory (SSL) and its parent laboratories have provided soil characterization information to customers for more than 70 years. Soil samples have been collected and analyzed from all states in the U. S., Trust Territories, and from more than 80 foreign countries. The SSL serves as the standards laboratory for cooperators and partners around the world. Consultations are made with field soil scientists and others on a daily basis concerning their needs for assistance in soils and other environmentally related projects. Such requests range from information for school projects to assisting with screening of urban garden sites to assisting with the development of threshold values for phosphorus. Our primary customers are field soil scientists and others who are working on soil surveys and technical soil services projects. Environmentally related projects have increased in recent years and present a special challenge.

Functions of the Soil Survey Laboratory

1. *Perform soil characterization analyses* in support of agency mission using established documented methods. Reference samples are analyzed to answer immediate questions of the customer. The more in depth needs (characterization samples) are addressed through project plans. The current capacity of the SSL is limited to about 7,000 samples (limited by staffing).
2. *Conduct research on methods development* in support of the laboratory, the Soil Survey program (mapping, landscape, soil genesis research, heavy metals, etc.), NRCS Division areas, field personnel, and other cooperators.
3. *Maintain in-house research facilities* for NSSC and field-based scientists.
4. *Maintain the National Soil Survey Database* and distribution of laboratory data and field pedon data. We have data for about 169,800 samples or about 26,800 pedons.
5. *Maintain the soil sample archive.* These samples often represent a fixed time frame and area of the world or nation that may be unique. We have over 15,900 pedons or over 100,000 samples in archive. (A few samples date back to the pre-bomb era).
6. *Serve as a standard for other cooperating laboratories.* The SSL provides both national and international service and often serves as a referee or standards laboratory for exchange studies.
7. *Provides training in both laboratory and data use and interpretations* for field personnel, scientists, technicians, and students.
8. *Provides consultation for customers on an as-needed basis.* Consultation may be related to projects submitted to the SSL, field needs, or projects that may require national or international work to solve specific soil survey related problems.
9. *Provides mutual interchange of scientific and soil survey (program) information* with professional colleagues in the USA and abroad.

The SSL participates in the Wageningen Evaluation Programmes for Analytical Laboratories (WEPAL), The Netherlands. Analytical interlaboratory results from more than three hundred member laboratories are evaluated for accuracy and precision. Results from comparisons are used by other laboratories for accreditation. The SSL has consistently received outstanding ratings, and our membership is maintained in order to assure the highest quality of data for our customers. We have found this service to be especially useful when implementing new methods and assessing other methods.

Priority Items for the Soil Survey Laboratory

1. Provide analytical data and research to address customer needs.
2. Equipment replacement and acquisition on a schedule to improve efficiency.
3. Budget to sustain a viable laboratory.
4. Laboratory Information Management System (LIMS) and database improvements to meet internal and external customer needs and expectations.
5. SMART SYSTEM for laboratory data.
6. Update SSIR 42.

How the SSL is Addressing Critical Agency Needs

1. Phosphorus

- Part of a consortium of a multidisciplinary team that is studying phosphorus in soils. We have several field projects that are designed to test and establish criteria that may assist farmers and ranches with controlling P loading in soils.
- We have developed methods and are collecting data that may be used to assist in determining threshold values for Benchmark Soils.

2. Soil Carbon

- The SSL is working with others in the NSSC and with cooperators using both established and new methods to provide data for determination of soil carbon balance ranging from field to global scales. These projects are complimented by NSSC and SSL efforts to develop methods that provide a better understanding of soil biological components.

3. Nutrient Management and Agriculture Waste

- We are working with members of the nutrient management team to develop criteria that may be used in development of nutrient management plans that are based on information that can be supported through the soil characterization database.

4. Water Quality

- The Soil Survey Laboratory is developing the capacity to do analyses in support of water quality projects and the Clean Water Act where NRCS and its customers may be involved. These projects include soil and water analyses as they relate to sediment and runoff.

5. Heavy and Trace Metals
- The SSL has developed the capacity to perform heavy and trace metal analyses to support field requests related to contaminated areas, mine tailings, urban areas, man-made soils, etc. This new service is proving popular to many of our customers.

6. Background Level for Major/Minor Elements
- The development of these capabilities by the SSL will assist the field in their development of nutrient management plans by providing baseline information and for determining the level of contamination in soils.

7. Soil Biology
- Soil biological support is provided in order to provide a more complete assessment of carbon levels, microbiological activity, and nutrient cycling in soils. Analytical procedures such as root biomass, mineralizable N, particulate organic matter, etc., are made on a limited basis.

8. Clay Mineralogy
- We have been unable to run clay mineralogy for the past year because of the x-ray diffractometer. We have recently replaced the x-ray, and will be able to resume production sometime in April.

Improved Management/Distribution of Data

The Soil Survey Laboratory is developing a Laboratory Information Management System (LIMS) to address its need for a modern data handling system. The LIMS will allow field scientists and other users better and more efficient access to SSL data, including electronic distribution. It will also make the current internet access to data in the database more user friendly.

Other Issues

Atterberg Limits
Analyses for Atterberg Limits is performed by the National Soil Mechanics Center in Lincoln (NSMC). For the past five years, the reduced staffing at the NSMC has drastically limited the number of samples that they can analyze for Soil Survey. Analyses have decreased from 500 to about 100 samples/year, resulting in unfulfilled requests.

SSL-LIMS Milestones
- ♦ 1982 - Lab staff stated "we need a new system"
- ♦ 1989 - Basic LIMS concepts defined
- ♦ 1990 - Purchased hardware and network
- ♦ 1995 - Purchased hardware and software
- ♦ 1997 - Business rules completed
- ♦ 1998 - Requirement statement completed
- ♦ 1999 - Contract programmers enlisted
- ♦ 2001 - LIMS version 1 released

Rational for replacing current information system

- Improve data quality
- Lack of management tools
- No integration of raw data and results
- Difficult to add procedures
- One preparation per sample
- One measurement per analysis (history lost)
- Improve automatic data collection
- Data system obsolete

Project Members: Steve Baird, Rob Harshbarger, Fred Kaisaki, Rick Nesser, Richard Pullman, Thomas Reinsch, Brenda Zhang

Contributors: Larry Arnold, Ellis Benham, Rebecca Burt, Dorn Egley, Jim Fortner, Russ Kelsea, Dewayne Mays, Gary Spivak

Features of NSL-LIMS

- Uniform data entry system
- Integrated data management
- Increased flexibility
- multiple preparations e.g. moist and dry
- add new procedures
- change instruments
- Manage project progress
- Database integrity through constraints
- Worklist generation - preparation and analyses
- Synchronized results and calculations
- Integrate with NASIS

Major differences between the current information system and the new

- Method codes
- Sample vs. Layer
- Electronic communication of project information
- Setting priorities
- Descriptions
- SSL will assume ownership of original description associated with sampled pedons
- Web site will remain the same until replaced

Some of the next tasks to be scheduled and completed

- The LIMS reports need to be available to our external customers. Initially the reports will be internal.
- Reports for the characterization data in LIMS, CMS, and descriptions should be available at the same web site.
- The point data part of NASIS needs to be developed. The LIMS-NASIS relationship needs to be established.
- The system requirements for version 2 of LIMS will need to be determined and written.

- A plan for interfacing other instruments needs to be developed since LIMS V1 is only interfaced to balances and bar code readers.

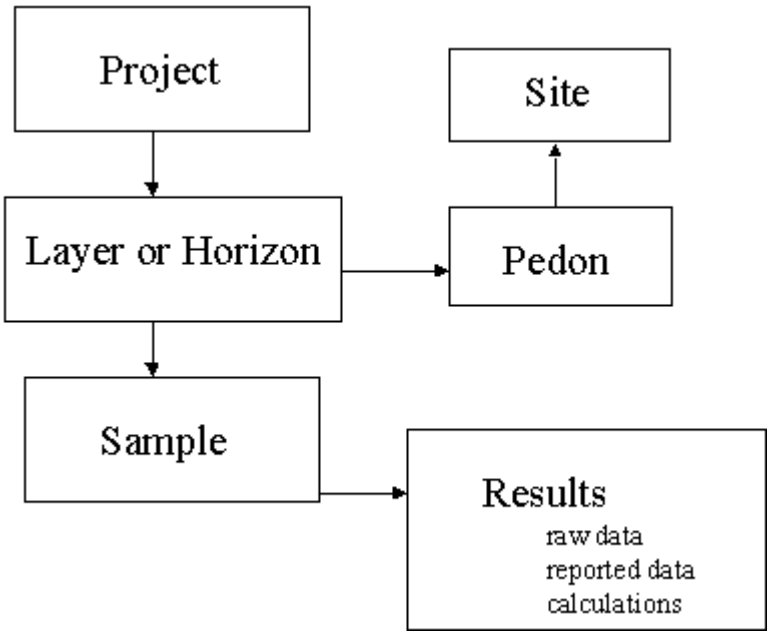
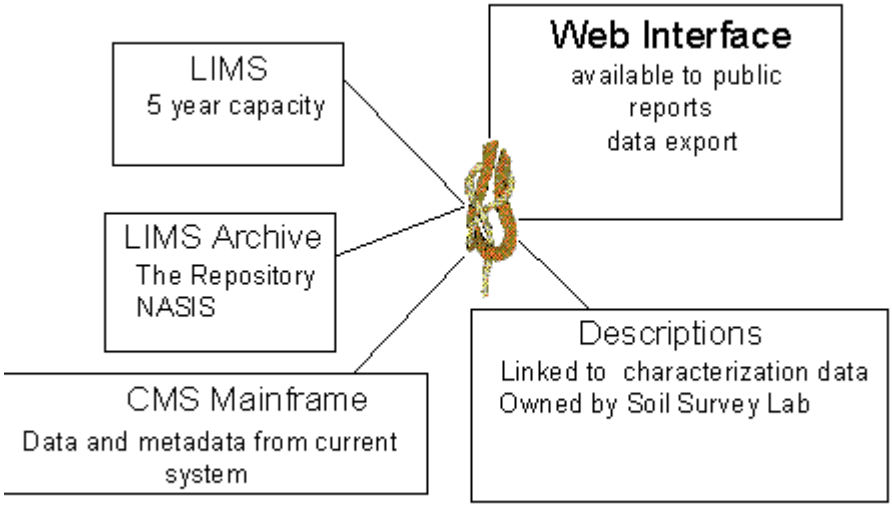


Figure 1. Basic Design

Figure 2. Schema of public access to characterization data



Soil Survey Schedule

Jim Ware, Soil Survey Division

Definition – Soil Survey Schedule

THE NASIS SOIL SURVEY SCHEDULE IS A PROGRAM MANAGEMENT TOOL FOR PLANNING, MANAGING, AND TRACKING STATUS, MILESTONE EVENTS, AND PROGRESS OF THE NATIONAL COOPERATIVE SOIL SURVEY (NCSS)

USES:

- Report Progress of NCSS
- Track Milestone Events
- Assess Workloads
- Plan and Manage Business Area Operations

WHERE IS IT?

IN NASIS

Access Through NASIS Interface

NASIS Permissions

Full Edit and Report Capabilities

Access through Web (limited)

Login and Password from Soils Hotline

Programmed Reports

Limited Data Management – Selected Legends/Data Elements

Business Areas: NHQ, DU, NCGC

WHAT WE DO

AS SOIL SCIENTISTS IN NRCS AND THE NCSS WE ARE RESPONSIBLE FOR 2 BASIC FUNCTIONS:

1. **PRODUCTION SURVEY ACTIVITIES**
   - ♦ INVENTORY SOIL RESOURCES
   - ♦ PRODUCE DATA & INFORMATION

2. **TECHNICAL SOIL SERVICES**
   - ♦ PROVIDE SOIL EXPERTISE TO USERS

WITHIN THIS CONTEXT, THE SOIL SURVEY SCHEDLE IS DESIGNED PRIMARILY TO TRACK PROCESSES & PROGRESS FOR **PRODUCTION SURVEY ACTIVITIES**.

"BLUEPRINT"

THE SOIL SURVEY SCHEDULE CAN BE CONSIDERED A "*BLUEPRINT*" OF OUR **SOIL BUSINESS MODEL** FOR **TRACKING PROCESSES AND PROGRESS** TOWARD COMPLETION OF A **FINAL PRODUCT(S) FOR SOIL SURVEY**

AREAS. SCHEDULE CONTAINS **LEGENDS** FOR ALL SOIL SURVEY AREAS OF THE NATION. LEGENDS ARE MADE UP OF **DATA ELEMENTS** WHICH IDENTIFY MAJOR PROCESSES INVOLVED IN THE INVENTORY AND PRODUCT DEVELOPMENT.

THE SOIL SURVEY AREA
TECHNICAL Aspect: "DOING SOIL BUSINESS"

> **MLRA Soil Survey Area.** A geographic (spatial) area defined within context of AH 296. Basis for conceptual and technical soil business, i.e., legend development, classification, correlation, etc. and quality assurance functions.

ADMINISTRATIVE Aspect: "DELIVERING SOIL PRODUCTS".

> **(Non-MLRA) Soil Survey Area.** Geographic (spatial) area that has a size and shape defined for efficient field operations and timely release of a final product.

Initial Survey - staff/complete field work in 3-5 years
Update Survey - staff/complete field work in 2-4 years
Maintenance operations – staff/complete field work in < 2 years

WHAT IS PROGRESS?

Progress includes Inventory of the Nation's soil resources, development of related databases, and production of related products and interpretative materials.

WHEN REPORTED?

- Mapping – Quarterly, minimum
- "Other" – Monthly, minimum

PROGRESS: NCSS PRODUCTION SURVEY ACTIVITIES
- **SOIL SURVEY SCHEDULE**

PROGRESS: TECH SERVICES & CUSTOMER ASSISTANCE
- PERFORMANCE & RESULTS MEASUREMENT SYSTEM (PRMS)

WHO REPORTS PROGRESS?

PARADIGM SHIFT: State Office → → Responsible Soil Business Area

SOIL BUSINESS AREA RESPONSIBLE FOR INITIATING AND/OR COMPLETING A BUSINESS PROCESS IS RESPONSIBLE FOR REPORTING PROGRESS AND/OR POPULATING DATA ELEMENTS IN SCHEDULE.

"DO THE DEED --- DO THE DATA"

WHAT ARE THE SOIL BUSINESS AREAS?
(GM 430, Part 402, Subpart B): Responsibilities and Organization

1. National Office
2. MLRA Offices
3. State Offices
4. Project Soil Survey Offices
5. Area and Field Offices
6. National Soil Survey Center
7. National Cartographic and Geospatial Center

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1. Digitizing Units
2. Digital Map Finishing Centers
3. National Production Services Staff

DATA STEWARDS – Populate Data Elements/ASSURE DATA QUALITY for Business Area

HELP

Two new Exhibits in NSSH Part 608 provide guidance for the administration and maintenance of Schedule – based on the new paradigm of "do the deed – do the data".

NSSH EXHIBIT 608-8 Soil Survey Schedule Guidelines

- Detail Administration &Maintenance Guidance for Program Managers and Data Stewards

NSSH EXHIBIT 608-9 Soil Survey Schedule Business Area Responsibilities

- Snapshot – "Who's Responsible for What Data Element"

These two Exhibits are companion documents and follow the following outline based on **Major Soil Survey Program Business Areas:**

I. Legend Administration & Acreage Maintenance
II. Mapping Goals & Progress
III. Imagery, Ortho & Map Compilation
IV. Initial & Update Survey Operations
V. National Digitizing Initiative

SOIL SURVEY STATUS

SOIL SURVEY AREA STATUS IDENTIFIES THE **OPERATIONAL ACTIVITY** OF SOIL SURVEY AREAS AND **CURRENCY OF PUBLISHED SOIL INFORMATION**.

ONE NAME CHANGE AND TWO ADDITIONS ARE PROPOSED. PROPOSED STATUS CODES ARE:

NON-PROJECT
INITIAL (Replaces Project)
PUBLISHED
OUT-OF-DATE
UPDATE
MAINTENANCE NEEDED (Proposed)
MAINTENANCE (Proposed)

It's All About Recruitment…Getting Who You Need, When You Need Them

Jason Parman, Office of Personnel Management, Kansas City, MO

What is Recruiting?
COMMUNICATION
With Candidates; With Colleagues; With Communities; With Schools; With Private Sector; With OPM; With Everyone…

Why Recruit?
For Your Office…
- ✓ Single most effective way to ensure you get the "best fit" for your position
- ✓ Maximizes the potential for quick fills, even when you are in a period of non-hiring

For Your Agency…
- ✓ Strengthens your nationwide "pipeline" of candidates
- ✓ Improves your visibility and competitiveness with private-sector companies

For Your "Uncle"…
- ✓ Improves the Federal government's corporate image
- ✓ Helps us all compete for talent

How Do You Do It?
Informal Methods
- ✓ Professional Meetings; Community, Social, Religious Organizations; Inbound Calls; Relationships

Formal Methods
- ✓ Advertising; Print Media; Internet; "PR Advertising";
- ✓ Face to Face; Job Fairs; On-Campus Trips; Speaking Appearances; Conferences

What Will We Do To Help?
- ✓ Internet Publicity
- ✓ "What's Hot" on USAJOBS during periods of growth in a state/region
- ✓ Constant presence on NRCS, USDA websites as well as USAJOBS, FedWorld, America's Job Bank
- ✓ Recruiters' Helpers

OPM's standard "recruiter's toolkit"
- ✓ Summary of benefits
- ✓ Family-Friendly programs
- ✓ Recruiting, retention bonus information
- ✓ Other government-wide information
- ✓ Inventory-specific FAQ's

"Recruiter's Referral" forms
- ✓ Let's us know you're interested
- ✓ Includes expected time to hire
- ✓ Helps applicant get on inventory more quickly

What Can We Do?

Nationwide

- ✓ Corporate Image Development
- ✓ Recruitment Material Development
- ✓ Alignment of Materials to Agency Mission and Corporate Image
- ✓ Recruitment/Recruiter Program Management
- ✓ ROI Calculations, Cost Management
- ✓ Recruiter Training Seminars/Orientations
- ✓ Structured Interview Seminars
- ✓ Complete Program Management

State/Region

- ✓ Relationship Building with Colleges
- ✓ Pipeline Maintenance with Local Sources
- ✓ Scheduling of Speaking Appearances
- ✓ Statewide/Regional Modules during Meetings
- ✓ On-Site Recruiting
- ✓ On-Site Examining

What Recruiting Isn't…

It isn't examining

Can't solve a recruiting problem with an examining solution
Examining ensures that once they're in the door, you can hire them
Recruiting gets them in the door

What We're Doing For You

- ✓ Inventory Improvements
- ✓ Transition to USA Staffing
- ✓ Technology Upgrades

"Low Impact" Changes

- ✓ Inventory Name Change
- ✓ Additional Methods of Response Input
- ✓ Additional Methods of Application Input
- ✓ Additional Methods of Product Delivery

"High Impact" Changes

- ✓ Removal of Rangeland Management Specialist
- ✓ Dual Certification
- ✓ Reduction of Geographic Locations
- ✓ Occupational Questionnaire Simplified
- ✓ Application Instructions Clarified

Possible Changes

- ✓ Assessment Tool
- ✓ Modify current 3 level system to include experience
- ✓ Integrate general competencies (soft skills) into assessment tool
- ✓ Remove 3 level system to eliminate "topping out" at each level based solely on education
- ✓ Additional Occupational Specialties

- ✓ Tailors candidate lists to different specialties; e.g. field mapping soil scientist
- ✓ Can be integrated for common specialties nationwide

When Will This Happen?

- ✓ New announcement can open as early as April 15, 2001
- ✓ Depends greatly on agency feedback
- ✓ Draft materials, options coming on e-mail to all interested parties next week or two
- ✓ Will be seamless to agency
- ✓ Recruiting materials can be integrated with examining program

Questions

jcparman@opm.gov

MLRA Approach to Soil Survey Why Change?

Tom Calhoun, Soil Survey Division

Mission is to get the concept of the MLRA approach to soil survey across to all that will listen. Repetition is key to doing that. As I told the MO leaders when they met in San Antonio this winter, you are going to hear this every time I am invited to speak.

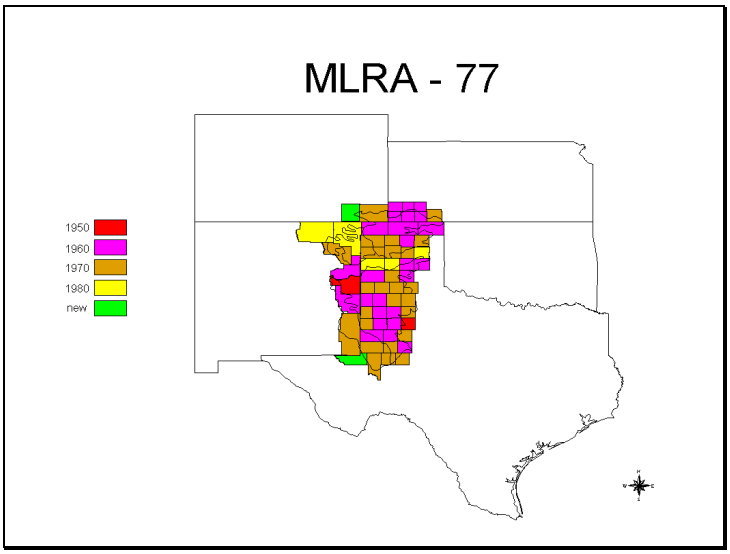
MLRA APPROACH TO SOIL SURVEY

- 1985 and subsequent "Farms Bills" need consistent, seamless soil data
- Demand for multi-county, multi-state, survey information increases
- NASIS implemented and it allows for management by geographic area
- SSURGO digitizing project initiated

1985 farm bill - big push to complete mapping of all farm lands------Conservation was directly linked as a prerequisite to cost share of conservation practices and commodity payments. ASCS, Farm Credit, etc. wanted data on all the farmland. They knew all farmland was mapped and when they found inconsistency in data between fields or on the same soils, same farm, different county, they complained. Other agencies wanted multi county, state, and national data sets. They wanted them digitized. They too found the mismatches in lines as well as data, and they couldn't handle all the different legends.

- 40% of published soil surveys are out of date
- The demand to update surveys equals or exceeds the demand for initial inventory
- The inconsistencies between independent county level soil surveys limit their usefulness
- A diversity of soil survey products is demanded

Customers wanted electronic data as well as hard copy. They wanted unique interpretations. Some wanted information for unique areas.



We found ourselves with a, as Dennis Lytle used to put it, patchwork quilt of information across the country. Different vintages, independently developed
With a great variety of need as far as updating.

KEEP THE FOCUS-- THE OBJECTIVES ARE:

- To update survey where needed
- To improve the quality of the data
- To provide seamless digital products
- To improve understanding of soil-landscape functions
- To maintain the data, not letting it become obsolete
- More efficient (fewer people and offices)
- Increased stability to the lives of our staff

With all of that, what are we trying to do with this new approach? Improving the quality of data includes additional investigations and characterization of soils. Some of our most common soils have the least data. New attributes need to be collected. Modeled or projected data needs to be confirmed. Investigate landscape functions. How can we provide better information on soils if we consider their interactions with the landscape?

MLRA legends: I've heard lots about this during the weeks leading up to this meeting. Much of it negative, but this is essential. I think, as with so many things we do, the terminology is getting in the way of the idea. The basic premise is this:
Soils on similar landscape positions, with similar climate, parent materials, age, etc. Should be the same or very similar. ie. MLRA

HOW DO WE DO ALL THAT?

- Develop soil survey legends on an MLRA basis
- Evaluate the workload and locate offices where there is a long term (15-20 year) need
- Establish "Super MLRA Project Offices"
- Clearly define the administrative soil survey area

Or for that matter, any other geographic entity you want to define ----
Within the area defined, investigations should apply to the entire area.

Review the placement and description of soils throughout their natural extent and improve on the mapping and description of those soils. Get rid of the Taxajuncts and variants. Where need be, combine series or parts of series. Where need be split out phases of series to accommodate changes in soil moisture or temperature due to subtleties in landscape position or shifts from north to south etc.

- Staff offices to conduct efficient project type work
- Appropriate expertise from foresters, agronomists, GIS experts, range conservationists, etc., should be available
- Focus on providing, not a book
- Phase in at the earliest opportunity

Administrative area: what is this all about? It has to do with conducting project activities. Soil Survey is by policy to be conducted on a project basis. That means an area is identified that can be staffed, equipped, and completed within a 3 to 5 year period. That is an administrative area. That is different in most cases from a MLRA. It is smaller, a subset if you will. It is essential for us to be able to provide imagery and other support that must be scheduled. It is essential for efficient operations.

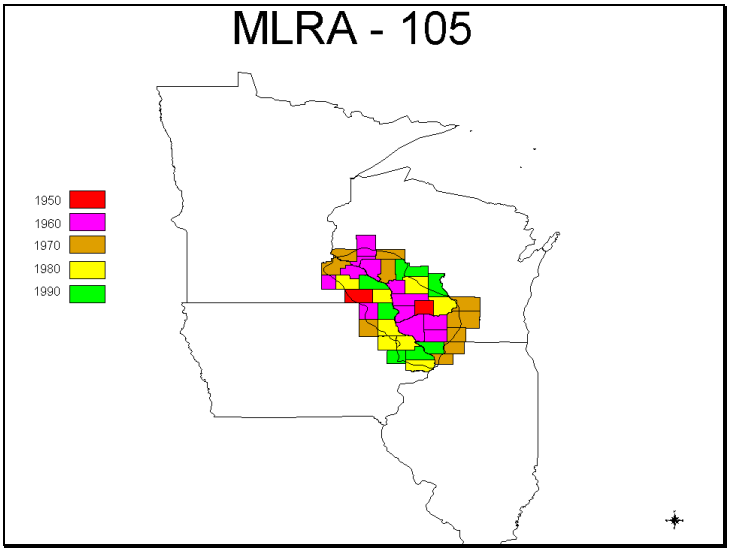
Info not a book; We have to get away from this publication mentality. It was and is a good concept for the first time over. Record copies is still the requirement, but don't sell that as the product for update soil surveys. The concept of having better information in tailored formats. I was just reading a letter from one of the stated bragging about the CD they had developed for one of their soil surveys. Their comment, after telling us how happy everyone was with the product, was that it was just a stop gap measure until the publication comes out. What do you think people are going to do with the book when they get it?

Phase in these offices. Your people have to go somewhere when they finish the survey they are currently working on. You haven't asked for special funds for that.

- Should be well equipped with computers, GIS, digitizing, printing, GPS, DOQ's, DEM's etc. required to do a good job
- Should be located where there are adequate communication links for data transmission

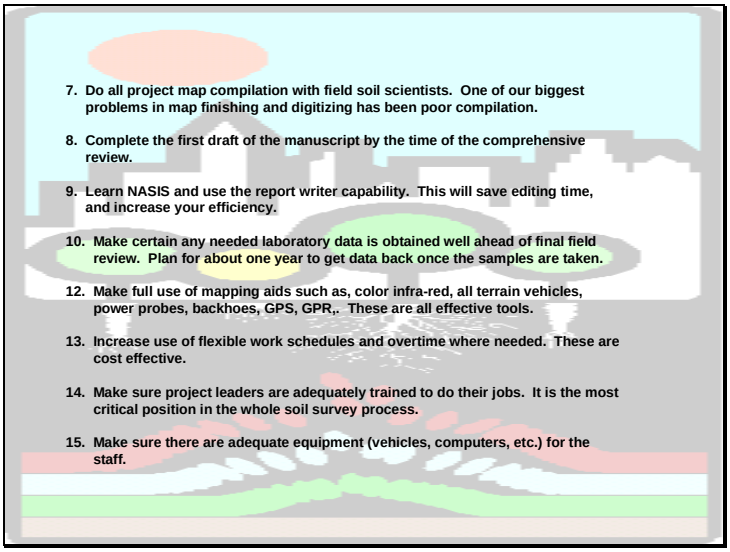
Adequate communication links: You have heard us encourage placing these offices on University campuses where possible. That is primarily because the Universities have better telecommunications that we do in our offices.

This is beginning to change now. But it also provided access to student help, helps with recruitment, and fosters closer cooperative relationships.



Within this geographic area known as: The Northern Mississippi Valley Loess Hills there are currently 40 independently developed legends. Why shouldn't our Tech Guides be consistent in an area as uniform as this? Investigations performed at any point in this geographic area should apply to the whole area. Databases can be updated!!! Interpretations can be more consistent. Legends can be simplified. Maps can be joined.

There are three MLRA offices proposed for this area. That should be a minimum of nine soil scientists looking at these landscapes. That means a capability of updating 500,000 acres per year. A 28-year job. However, all doesn't need to be remapped. 8 Counties are new; another 8 are less than 20 years old. Maintenance is appropriate for those. The remaining 24 counties need projects designed. 15 years at best if managed well.



The MLRA Concept for Production Soil Survey

Questions, Statements, Comments, Misunderstandings, and Myths

1. **Question:** Why is the Soil Survey Program separating itself from the rest of the agency?

Answer: The Soil Survey Program is not separating itself from the rest of the agency. The program has specific legislation to conduct the inventory of soil resources, to provide specific interpretations for those soils on the private lands of the United States and to provide that information to the general public as soon as possible after the inventory is completed. NRCS is designated as the agency in charge of this program. The program is unique in that the inventory is to be conducted for and the information published for the general public, not just for the agency or its cooperators.

The Division continually strives to find ways to more effectively and efficiently conduct the soil inventory and meet the programmatic demands on this information. This has been particularly challenging in these times of declining federal budgets. The MLRA approach to soil survey is a geographic approach to collecting geographic information. It is a more efficient way to update older surveys, and it provides a mechanism for maintaining current information. It also provides a more comprehensive approach to providing consistent, coordinated, national, and state data sets required by current agricultural and other programs. This is a change from past approaches of re-mapping an area on a 20-25 year cycle. It is also a change from mapping on a political basis (county boundary) where each survey is an independent entity, to mapping on a geographic basis (natural landscapes) where consistent coordinated data sets are needed that cross political boundaries.

2. **Question:** Why was the MLRA Concept initiated?

Answer: The concept was initiated because the demands on soil information were increasing and changing, and the methods of inventory collection and dissemination were changing while budgets were stagnant. The 1985 Farm Bill programs started requiring soil information for qualifying individuals for conservation cost share funding. Inconsistencies in soil data between soil surveys or counties were not acceptable. Computer power was made available to field and project offices and resource information was needed in electronic formats. All of these things demanded that the agency re-evaluate the way it conducted its soil survey program.

Digitizing soil surveys and using GIS enabled users of soil information to mosaic individual surveys together and conduct land-use evaluations on larger areas. This kind of application was cumbersome with multiple legends and inconsistencies in data and line work between individual soil surveys.

To eliminate the inconsistencies between data sets it was necessary to look at the geographic area of occurrence for each soil. This process could be used to update larger areas in a shorter period of time. In addition, the computer power available to field soil scientists provided additional capabilities in quality control of the data. Access to National Soil Information System (NASIS) was provided and a centralized quality control staff was no longer required. Quality control could be provided on a geographic area also, meaning better expertise available closer to the field. Finally, providing information to the public was becoming more complex. The printed text was required in some areas; individual electronic soil surveys in some, statewide data sets and national data sets in others. This increased use of information and multiple formats for data required that staff time be devoted to providing information quicker and to providing assistance in the use of the data.

All of these things led to the development of doing project soil survey work on a geographic basis (MLRA) in order to bring older surveys up to standard and eliminate inconsistencies, and then keeping those surveys current. Quality control was then provided for groups of MLRAs instead of nationally so better expertise could be brought to bear, and development of multiple formats for information and assistance in the use of that information became the responsibility of the State Soil Scientist.

3. **Statement:** There should not be a national deadline for implementing this concept.

Answer: There is not a national deadline, however, the Division will continue to encourage the implementation as rapidly as possible. There are soil surveys in process that must be completed. The Division does not want to impede or slow down the progress of those surveys. When they are completed, personnel should be moved to locations where there will be a long-term workload to be addressed and where there is the proper support for soil survey activities from both other technical staff and physical facilities such as communication, GIS, and computer equipment.

Improving the efficiency and effectiveness of the soil survey staff is especially important in these days of increased accountability. Maintaining or improving our productivity in these times of tight budgets will show that we are striving to find new and better ways to do a better job.

As funding becomes available, the Division will develop incentives to more rapidly move into the MLRA concept. In the mean time, better productivity from the staff, more economical office space, improved morale, better products for our customers should be sufficient incentive and the transition will be phased in as opportunities and resources present themselves.

4. **Statement:** States should implement this concept only when it will result in improved customer service within the other mission areas of the agency.

Answer: The agency has a responsibility to improve all of its service from all of its programs. There is no percentage in holding back one program from improving its processes, products, and efficiency until others show similar results. Good managers should take advantage of opportunities that present themselves.

The agency's customers have demanded better soil information, more consistent data, more diversity in products, and more assistance in using soil information. The MLRA approach enables the agency to meet those demands. Other agency programs will benefit quicker by having digital data, more consistent data, and more assistance in the use of the data as soon as possible.

5. **Statement:** Because of the size of the counties in some states, it is not always practical to complete several counties from one central office location. Consequently, the life of a project office in these areas may be shorter than the ideal concept.

Answer: The size of the counties is not important. There are several factors that need to be considered. First is the consistency and complexity of the landscapes. The effort is to bring surveys of various vintages up to current standard by updating information on a landscape basis. Any soil scientist doing work on a segment of a particular landscape, whether or not it is in the same county, contributes to the body of knowledge for that entire landscape. Second is how current the soil information is. There may be large areas that have current information and only minor adjustments needed for maintenance. Where areas are in need of updating, the work should be prioritized by urgency of need. With our information in digital format and data in NASIS we now have the capability of updating individual quads or parts of quads soil survey if that is what is needed. This information can be merged into the databases and new products on line in very short time.

The need to update older information must be evaluated, and where the need is sufficient to justify an office, it should be established. At the same time it is important to consider the needs of the staff. It is harder and harder to maintain a staff of qualified soil scientists when they have to consider relocating every 5 years or sooner. Locating staffs in areas

that have an extended workload and establishing offices in those locations provides stability to the lives of the employees, saves the high expense of relocation and equipping offices, and provides a better atmosphere for producing higher quality products through opportunities of interacting with other soil scientists and technical disciplines. It also provides better opportunities to take advantage of the best in communications and computer capability.

There are always exceptions, and when there is a particular need that can not be met through one of these MLRA offices, then other means must and will be provided.

6. **Statement:** Staffs for these project offices should not be strictly on an MLRA basis.

Answer: The key word should be geographic not MLRA. It is important that the soil scientists address the workload on a geographic basis. This may entail working only in a part of an MLRA in multiple MLRAs, or even on a quad or part of a quad, depending on the workload. What is important is the approach to collecting the information needs to geographically based, not politically based if the inconsistencies in the current multiple data sets are to be corrected and data improved.

7. **Statement:** There is no need for project offices to be separate from field service centers or area offices.

Answer: This may be true. If these offices are located in proximity to the soil survey workload and they have the required communication, computer, and other technical staff needed to do the soil survey work, then they probably are the proper location. We have encouraged looking at university and college campuses because often the communication lines are faster, the computer equipment is better, the technical interaction is more stimulating, and because in some cases, it improves relations with our cooperators. However, where these needs can be met at a service center or area office, they should be taken utilized.

8. **Statement:** GIS staff should be available to support all disciplines and not assigned to soil survey project offices.

Answer: We feel that the MLRA Project office should be equipped and staffed to do the best job possible in addressing the workload. If that requires full time GIS staff support, that is what is needed. We are not advocating assigning all GIS staff only to soil survey offices.

9. **Statement:** These offices need to be integrated into the functions of the agency's overall program operations.

Answer: This statement makes it sound as if soil survey were not an agency program. Soil Survey is one of the overall agency programs and it should be managed to be as efficient and effective as possible. These offices need to be established wherever the need justifies their existence. The location of the office need not be confused with the

need for technical expertise in support of other agency programs. If the workload is such that soil scientists have no time for soil survey, then a reassessment of staffing needs to be made. Additional soil scientists may be needed to support other agency programs and those should be budgeted for in the appropriate funds provided for those programs. Soil Survey funding is provided primarily for the conduct and support of soil surveys and the respective products required to deliver that information. Just because an employee is in the 470 Series does not require that his/her salary be supported with soil survey funding.

10. **Statement:** MLRA soil scientists must be available to support field office operations.

Answer: This kind of support is what the Division has called Technical Soil Services. Under the MLRA approach to soil survey this support is the responsibility of the state soil scientist not the MLRA leader. The state soil scientist must ensure sufficient soil science expertise is available to provide for the agency needs. This expertise should not, however, be at the expense of the soil survey program. It should be provided through the programs requiring the support. It may be appropriate to locate that staff in MLRA or other agency offices depending on the location of the workload.

11. **Statement:** Some locations may need to utilize satellite offices for several MLRAs.

Answer: If the workload is such that it can not be adequately addressed from an MLRA office location, then this is a valid alternative. It, however, should not be a mechanism for circumventing the transition to the MLRA approach to soil survey.

12. **Statement:** Some locations can and will be able to serve more than one MLRA, or share MLRAs between locations.

Answer: This is valid, and in fact focuses on one of the strengths of the MLRA approach to soil survey. If two or more staffs share work on the same MLRA or MLRAs, their observations and data are valid for the entire geographic extent of the MLRA. That way there are more eyes seeing the soils, more data being collected and better information coming out, in the long run, with less work.

13. **Question:** How will the budget be handled for offices that straddle state and regional lines?

Answer: Currently there are no plans to change the way State budget allocations are developed. The process is based on the total workload, not the location of offices. If you have staff assigned to an office in an adjacent state, those individuals are still your staff. Arrangements should be made between states sharing offices on providing support to those staff. State Conservationists have the opportunity to participate on the "MO Board of Directors" and it is through that mechanism that they can ensure they are receiving their fair share of staff time in addressing their states soil survey needs.

14. **Question:** In some states, project offices are located on college campuses. What is the advantage in doing this?

Answer: We have encouraged looking at university and college campuses because often the communication lines are faster, the computer equipment is better, the technical interaction is more stimulating, and because in some cases it improves relations with our cooperators. We have encouraged this alternative in areas where NRCS does not have a facility such as a service center to provide the proper level of support. These locations also provide opportunities to work with students on special projects that might not otherwise get done. This can often lead to employment for students, and an opportunity for NRCS to get to know potential employees before making a commitment on employment.

DISCUSSION GROUPS

Group 1---Training

Soil Mechanics (and uses for engineering interps)	Engineering Staffs
How to use the Soil Data Viewer, develop interps, and provide products.	ITC, NSSC, add to NASIS workshops, State GIS staffs
GIS products (ArcView, SDV, 3dMapper, CST, other models) awareness and use training	State & regional workshops
What soils data are used in those and other models	Soil Technology Programs & Application course
NASIS - how derive a variety of interpretations (basic, query, interps)	Workshops (NSSC, MO, States)
Use of computerized mapping aids (on-screen digitizing rectifying & compilation)	NCGC, Vendors
Using NASIS to generate (link to) spatial queries	Workshops (NSSC, MO, States)

How to pick the right tool for report generation (NASIS, CST, SDV)	Workshops (NSSC, MO, States)
What tools (physical) are available for on-site investigations and how to use them	NSSC, Institutes, States, Nat'l Soc of Consulting SS, NCSS Partners
How approach evaluating survey status (field studies, maintenance)	NSH, Gesostatistic assistance from partners
Urban interpretations	County & city gov't, NSSC, EPA
Interdisciplinary knowledge (agronomy, forestry, water quality)	Institutes, IRT's, Coursework, Extension,self-direction
CNMP data and interpretation needs (RSS in role of support for planning)	State Agronomist, State Training Teams, Universities
Use of the Internet as a marketing and informational tool	Public Information Officers, Classes
Communications inside and outside agency (people skills)	Toastmaster's, Classes, Readings, OJT, Practice
Networking training	Vendors, Universities, Videos
Presentation training (public speaking & presentations)	Vendors, Universities, Videos, Toastmaster's
Marketing skills	Vendors, Universities, Videos
Recruitment	OPM, HRO

Internal communications	Meetings, contacts, workshops, mentors
Support to do the job right (budget & training)	SO
Writing skills	Vendors, Universities, Videos
Precision farming techniques, methods, and soil data needs	Universities, vendors, farmers, journals, ag research, agrons
Basic photo interpretation	SO, NCGC
Plant identification	PMC, Foresters, Range Cons, other Soil Scientists
Crop responses (nutrient and stress indicators)	Universities, vendors, farmers, journals, ag research, agrons, saline/sodic course
Soil biology	Planner, SQI, Centers
Soil quality and use of the Soil Quality Toolkit	SQI, Centers, SO
Remote sensing	NCGC, SO, Classes
Wetlands and hydric soils	Formal NRCS, Univ, COE, Wetlands, Institutes
Tribal interactions (government to government)	NEDC, Native Am SEPM, Tribes

Cultural resources	SO
Farm Bill training - know what's coming and what will be in there	SO
LESA and FPPA training	Nat'l training
Farmland Protection Program	SO
Conservation Planning process for working with DC's	Beginning course, SO, FO personnel, certification training
SWAPA+H issues	SO, Internet
Quality assurance reviews from MO's	MO, NSH, SO
Field office appraisals	SO, GM, actual experience
TMDL and soil data needs	SO, partners
Need to hear about the results of product testing	Internet, magazines, workshops, SO
Need to know a little about everything	All of the above and more

Group 2---Technical Soil Services- Roles and Responsibilities

Definition/Interpretation – What does Technical Soil Services Mean?

CO-O2- Production and explanation of soil survey products

CO-01- Application of Soil Survey in Agency Programs

Both are technical Soil Services, only the funding is different.

Note- PL89-560 –Assistance for community planning and resource development. Does this require us to seek funding for TSS for technical soil Services for the purposes stated in the law?

Roles and Responsibilities-

Current Roles and Responsibilities were discussed during other parts of the Meeting and are in the National Soils Handbook Part 655. Soil Scientists need to understand these responsibilities and their application.

Additional Comments by the group:

Flexibility to perform a variety of tasks

Open soil conservationist positions to TSS 470 series especially in cases (areas) where most activities are TSS related.

Range conservation, wetland determinations, engineering investigations, LESA, prime and important farmland determinations, education.

Not all TSS must be provided by soil scientists- could establish "job approval" authority as one state has done.

Combined responsibilities of TSS and SSPL

Some TSS add to and edit NASIS soil data, or provide customized or specific types or formats of soil data.

Apply research data to soil survey work and data.

How many states have combined the responsibilities SSPL and TSS in last few years?

Some states did and those that have combined the responsibilities felt it was a matter of limited, tighter budgets.

How many states have Resource Soil Scientists that do not map? Four of the states in the group had RSS that had no mapping goals and they are all supervised by someone other than soil scientists.

In Maine a void was left when soil survey projects were completed in the area and soil scientists moved. This created a recognized need for Resource Soil Scientists.

Reported Acres are currently the only measuring tool for Soil Scientists (CO02), but acres does not cover all the functions carried out under the CO-02 program. (I.E. other parts of soil survey production are assumed and/or documented in NASIS.)

Recommendation- Need better reporting systems for TSS.

Critical things are getting done but some of the things that should be done can't get worked on because of inadequate resources.

Where RSS map soils and provide TSS, a balance must be struck. TSS and Soil Survey production are inversely related. If TSS goes up, SS acres go down or quality decreases, with equal resources.

States need to identify all needs for TSS in workload analysis; we must look at the functions performed by Soil Conservationists, Engineers, etc. Soils are only a small part of some of the workload.

Questioned states present in the group on the portion of workload of TSS that is performed for Agency (NRCS) Programs versus those for State. Local, public, or other federal agencies:

For NRCS Programs	For Others
60	40
20	80
90	10
40	60
25	75
75	25
60	40

Wide variations exist from state to state on the portions of TSS for NRSC vs. that for other agencies. It might be a good idea to poll all states to see if this is geographically related, especially since this may be a significant factor in deciding a funding formula for TSS.

What is the scope of authority?

The group discussed this issue extensively. There are obvious differences in how this is interpreted by different states. The following were some of the views expressed by different group members.

On-site assistance to non-Conservation practices
On-site assistance or other assistance to district cooperators
Do not interfere with services provided by the private sector
Do not review or evaluate mapping for specific non-agency purposes.
Enter cooperative agreements with state/county agencies to provide onsite assistance technical investigations, or services
Federal Agreements are reimbursed for mapping. Other kinds of services may not always be reimbursed?

Individuals in the group listed some things they felt that should not be done:

Those beyond our expertise
A more detailed Soil Survey without a MOU or cooperative agreement
We don't really understand our authorities or they are inconsistently interpreted or applied from state to state.
Does an agreement through a Conservation district or state/county agency, expand our authority to provide services?
Should not provide service for another agencies regulatory program.

What Is the Ideal Structure?

State Conservationist and state management recognizes the importance of TSS. Resource Soil Science positions designed to assist field offices with workloads.
Make a distinction between TSS activities and mapping and production activities.
Fund some parts of TSS by cooperative agreement
At least one person per NRCS administrative area to provide TSS
Foster sharing of personnel for TSS across political boundaries.
Adequate budget based on workload analysis, needs and performance.
Put TSS in agreement for updating and maintenance projects.

Group 3—Resource Soil Scientists/Supervision

Summary of Discussion

The workgroup reviewed the main points from the Technical Soil Services Issue Paper developed at the 1997 State Soil Scientist meeting.

The group discussed the issue of supervision of the soil scientists who are responsible for technical soil services. The 1997 Technical Soil Services issue paper recommended that the state soil scientist should supervise these soil scientists. The recently issued General Manual policy regarding this was reviewed. It was determined that the policy adequately covers this issue, but the policy is not being followed is many states.

It was also noted during the discussion that policy states that project leaders are to be supervised by the MO Leader, unless the MO Leader delegates this responsibility to the states. Only in rare instances are the MO Leaders supervising the project leaders within a state other their own. Although the MO Leaders have not delegated this responsibility to the state, individuals within the state supervise the project leaders. The workgroup thought that the reference of MLRA Leaders as supervisors of project leaders should be removed from the policy in the General Manual for the following reasons: 1) the supervision of the project leaders can be adequately accomplished by the state soil scientist, 2) the MO Leader in most instances is too geographically remote from the project offices in other states to adequately accomplish supervision, and 3) project leaders and their staffs accomplish many other duties that are under the administrative responsibility of the state soil scientist and not the MO Leader. Most members of the committee agreed that the state soil scientist should be the supervisor of project leaders.

The workgroup discussed the need to develop a process for capturing technical soil services accomplishments by a reporting system. It was noted that at the 1997 State Soil Scientist meeting, it was recommended that a QIT be established to further study this issue. The workgroup thought that is was appropriate to recommend that the 1997 recommendation be implemented.

Group 4---Soil Survey Maintenance/Evaluations for Updates

Intro NSSH 608 - Developing SS Schedule
published, project, non-project update, out-of-date
NSSH 610 - Developing plan to maintain SS area
Revision: extension, partial, limited, supplemental soil mapping, and updating

Policy and Reality

Is initial and update correct terminology
1st question published in early 1900s
2nd question published (modern-day) = 1st on photobase

Products

Do we want to record products?
Draft 608 Exhibit 608-8 bits: Interim report, soil attribute/spatial on CD-ROM, soil survey report on CD-ROM, three-ring bound manuscript, traditional bound manuscript, web publication

Gordon - conflict between states and product is a product is not produced, which is a real case.

Recommendation: Add Status "Project Complete - No Publication Planned" to Status of SS Map

Soil Survey Area Status: Out-of-Date = Has a published report, no longer meets the needs of the user; requires extensive revision updates maintenance

Recommendation: "Out of Date" change to "Update Needed" but evaluate "Out of Date" for political consideration

Option 2: Out of Date - Update Needed
Out of Date - Maintenance Needed

NSSH Part 610 Soil Survey Revision
Extensive Revision, Partial, Limited, Supplemental

Recommendation: Review all categories to address the electronic delivery of SS information in lieu (NSSH Part 610) of hard copy revision

More emphasis on soil survey evaluation for updating SS.
So the RSSs have responsibility to perform evaluations as to adequacy of SS? They determine need for "Update" for MD-Office?

Recommendation: GM and NSSH guidance is clear and adequate, but a "NASIS Data Map Unit SS Evaluation Compare Tool" is needed (for updating) NSSH 608

Should RSS Assist with on-going survey?

Yes

Do MO's keep doing correlation amendments?

Yes

When should soil technical assistance be reimbursable?

Need clarification of question.

National State Soil Scientist Meeting-Items for the Soil Survey Division to Consider for Action

March 19-22, 2001
Lawrence, KS

1) Identify the "champions" of the soil survey program and obtain their support.
2) Examine MOU's with land grant colleges, work with appropriate Deans if they need to be strengthened
3) Encourage the "scientist" part of our working titles through professional memberships, certifications, and scientific readings.
4) Progress in our thinking beyond the polygon-based mapping model
5) State Soil Scientists need to take both active and passive marketing approaches.
6) State Soil Scientists need to track the "hits" on state soil Web sites to determine who our customers are for that forum.
7) Distribute instructional guidelines outlining accepted and conventional techniques for preparing slides for Power Point presentations.
8) Work with Universities on cooperative investigations of phosphorous movement in the soil.
9) Soil Scientists need to provide feedback to Gary Muckel on the themes for yearly marketing goals and target audiences for soil survey:
10) **2001 - Incorporate soils into natural resource education with science teachers as the targeted audience.**
11) **2002 - Improve soil management on working lands with land managers and their advisors including field office staffs of NRCS as the targeted audience.**
12) **2003 - Reduced lose of life and property due to improper soil selection or management with homebuilders, land use planners, and land contractors targeted.**
13) **2004 - Expand understanding and protection on wildlands with wildland managers, education interpreters, and others that work on state and Federal parks, and military land targeted.**
14) NHQ needs to define, in writing to State Conservationists, that the assigned state goals for LESA completions refer only to the LE part and not the SA portion.
15) NSSC will write and distribute the metadata requirement for interpretations placed on the central NASIS server.
16) State Soil Scientists need to deliver one soil database per state for use in RUSLE2 and WEPS training.
17) MO Leaders need to coordinate the update of obsolete taxonomic classifications for use with the STATSGO update process by July 1.
18) Need to think of the March 30 deadline for NASIS population for electronic CRP signup as a "heads-up" only for future data automation needs.
19) States need to supply landscape photos or slides typifying LRR's to Jim Fortner for use in the new handbook.
20) Start thinking about how to incorporate vegetation and plant science specialists on state or MO staffs.

21) Form a committee to look at the issue of soil survey delivery and the option of limited hard-copy publication and increased CD delivery.
22) Substitute "Customer Service Toolkit" for "Field Office Computing System" in the General Manual.
23) National Production Services will supply examples of PDF format manuscripts and maps on CD's to the states for their evaluation.
24) Create a national symposium on soil landscape analysis, pre-mapping tools, expert systems, etc.
25) Improve transfer of technology among states (e.g. compilation automation and mapping analysis)
26) Define what is considered an "acceptable speed of transfer for NASIS access so that ITC can identify and evaluate the bottlenecks that occur.
27) Get all NASIS users in the country up to that "acceptable" level.
28) Change policy and guidance documents (GM and NSH) to better define "official soils data" and who has the responsibility to certify that "official data".
29) Relate to State and National leadership the importance of a "Data Warehouse" to archive and establish official soil data sets for the field office user.
30) Involve NCSS partners in the discussions of what should be the "Official Soils Database".
31) Establish a task force to assist in the development of National P indexes or guidelines for the country.
32) States are to send all Soil-10's in to the NSSC to be added into the database. All States need to make sure all site locations are filled in(lat/long).
33) Consider changing the Soil Survey Schedule to reflect the new "Initial Survey" term instead of "Project Survey". Add new codes for "Maintenance Needed" and just "Maintenance"
34) Develop an Internet library of educational materials (text, PowerPoint) with review for consistent format.
35) Develop a detailed training checklist for Resource Soil Scientists
36) Delete the reference to MO Leaders as supervisors of the soil survey project leaders from the General Manual 402.10 (b) (5) since the current policy is not followed in many states.
37) Establish of a QIT to review and make recommendations to SSD Director regarding a Technical Soil Services reporting system. Establish this by the National Soil Survey Work Planning Conference in June.
38) Establish an Ad Hoc Committee, with regional representation from multiple disciplines, to assist the National Leader for TSS in providing products and services to meet state needs.
39) Consider adding "Project Complete - No Publication Planned" and "Update Needed" (if politically correct) categories to status maps

APPENDIX I

National State Soil Scientist's Meeting-Agenda

"DELIVERING TECHNICAL SOIL SERVICES"
March 19-22, 2001
Lawrence, KS

Monday March 19, 2001 Moderator Richard Schlepp, SSS-KS

Regency Room -- Holiday Inn

2:00-2:20 PM **Welcome—State Conservationist KS-*Tomas M. Dominguez***

2:20 – 2:50 PM **Introductions & Expectations –Maxine Levin, NHQ SSD**

2:50 – 3:00 PM **Development of Action Register—**Assignment of Action Register Team to follow presentations and facilitate recording of Action items with flip charts and note-taking.(**Team Leader-David Hoover, SSS-ID Team Members-Carmen Santiago, SSS-PR; Travis Neeley, SSS-IN; Jerry Daigle, SSS-LA; Dennis Potter, SSS-MO)**

3:00-3:30 PM **Break**

3:30- 4:00 PM **Soil Survey Division Priorities –*Horace Smith, Director***

4:00- 4:30 PM **Partnership Activities in Kansas—Applications to Technical Soil Services, *Michel D. Ransom, Kansas State University, Manhattan, KS***

4:30-5:00 PM **Planning for the Science of Soil Survey in the 21St Century, *Maurice Mausbach, Deputy Chief, Soil Survey and Resource Assessment, NRCS***

5:00 PM **Soils Social Hour (Rooms 147 & 149 near the pool)**

Tuesday March 20, 2001 Moderator *Darwin Newton, SSS-TN*

Regency Room -- Holiday Inn

8 –8:30AM **Defining the National Soil Survey Center's and States' roles with regard to interpretations—*Berman Hudson NSSC***
Working with groups to set criteria, soil interpretations and potentials. How to work with state and local groups to provide the information they need Data vs. information and setting up data use guidelines

8:30-9:15AM **Panel of Resource Soil Scientists from the Field:** Case studies in typical workloads **(Richard Bednarek, Atlantic, IA; Ramiro Molina, Corpus Christi TX, Glenn Stanisewski, Davis, CA)**

9:15—9:30AM **Marketing the Soil Survey** Working with the Web ***(Gary Muckel, NSSC)***

9:30--10AM **Break**

10-11:00AM **Conservation Programs(Interpretations & Technical Soil Services)—(*Panel-DeWayne Mays(NSSL), Bob Nielsen(NSSC), Joyce Scheyer(NSSC),Ron Harris, AFO, Stefanie Aschmann, WSI, Robert Weatherspoon, Lake City FL)***
AFO---Animal Feeding Operations; Nutrient Management Planning; CNMP Certification (soils training); Watershed Institute—Watershed Ecosystem Nutrient Dynamics-P model. The P index, nitrate leaching, pesticide leaching index etc. are becoming big issues. What are folks doing about data/models that can be used for these topics?; Urban soil interps
(State Soil Scientists will submit questions for Panel to answer; Moderator Darwin Newton will ask questions and facilitate discussion)

11:00AM-12 Noon **Conservation Programs(Interpretations & Technical Soil Services*) continued—(Panel to include Mac Henning (Bob Nielsen) (CRP), Cheryl Simmons (LESA Coor), Dave Lightle, (NSSC),Ray Sinclair (NSSC))*** CRP---Frozen HEL Lists; WEPPS, RUSLE, soil erosion models; LESA, FPPA and AD-1006. Need a way to do the land evaluation part of LESA to rank the soils like we used to do through Ames. A module for NASIS? **(State Soil Scientists will submit questions for Panel to answer; Moderator Darwin Newton will ask questions and facilitate discussion)**

12:00 Noon **Lunch**

Tuesday March 20, 2001 Moderator *Mike Sucik, SSS-IA*

Regency Room -- Holiday Inn (Soil Data Quality Specialists –Brazilian Room)

1–-1:20 PM **National Cartographic & Geospatial Center-**Soil Survey activities and priorities**---*Tommie Parham, Director, NCGC***

1:20-2:00 PM **MLRA Revision Ag Handbook 296/ STATSGO—*Jim Fortner and Sharon Waltman, NSSC***

2:00-2:30PM **Drought/Soil Moisture & Temperature Surveys**—Drought Commission Recommendations; SCAN sites; Drought Monitor-

NOAA**(*Ron Paetzold , NSSC and Jon Werner, NWCC& Engineering Div. NRCS*)**

2:30-3:00PM **Break**

3:00-3:30 PM **Carbon Sequestration/Interpretations** Kyoto Protocol; Legislation (Harkin & Roberts Bills); Carbon sampling ***(Joel Brown, GLTI Cooperating Scientist)***

3:30-4:00 PM **Soil Quality**—Use Dependent data (Ecosites-interpretations by "state" levels); Soil Quality Tool Kit; Urban Tech notes; Soil Quality Assessment Guide to include soil quality in conservation planning; Carbon CQESTER beta testing ***(Craig Ditzler, SQI and Mike Sucik, SSS-IA)***

4:00-4:20 PM **Ecological Sites Inventory-**partnership with soil survey**(Curtis Talbot, NSSC)**

4:20-5:00 PM **Publications**---Process after writing and map finishing are done. What are our alternatives?**(*Jimmy Todd, NPSS, Stan Anderson, NSSC & Mike Kortum, NCGC*) (Moderator Mike Sucik will ask questions and facilitate discussion)**

5:00 PM **Logistics for Computer Technology Demonstrations tomorrow-Rick Schlepp**

5 PM – 7:30PM Soils Social Hour; Computer Technology Demo Forum- State Soil Scientists are encouraged to bring CD's or Demos of their products or demos to show on laptop systems to others informally **(Rooms 147& 149 near the pool)**

Wednesday March 21, 2001 Moderator *Phil Camp, SSS-AZ*

Convene at University of Kansas, Wescoe Hall, Rm 3139

8 –8:45AM **NASIS/SSURGO**---SBAAG Update; Ft. Collins activity; Digitizing Centers/Map Finishing Center activity; (**Panel-Jon Gerken, Ken Harward, Ken Lubich -**10 min each with 15 minutes for questions from floor**)**

8:45-10:00AM **Public Distribution/NASIS** – NASIS 5.0 Central Server and new tools for Resource Soil Scientists; Soil Data Warehouse; Lighthouse Project; Soil Data Viewer & Customer Service Tool Kit; Web access to soil survey data; issues related to "official" data; national and state interpretations; data requirements for program delivery; and data population workload and responsibility.

(**Panel-Russ Kelsea, Rick Bigler, Bob Nielsen, Jim Fortner, Terry Aho, Ken Harward)**

10-10:30 AM **Break**

10:30-11:15 AM **Public Distribution/NASIS—(continued)**

11:15AM-12 Noon **Geophysical Methods within USDA/NRCS: Applications and Interpretations** (Geophysical Initiative) Overview of activities in soil survey and conservation applications**–Jim Doolittle, NSSC**

12 Noon **Lunch**

Wednesday March 21, 2001 Moderator *Karl Hipple, SSS-WA*

Convene at University of Kansas, Wescoe Hall, Rm 3139

1-1:30 PM **Landscape Analysis/GIS**—Overview of activity that could apply to Resource Soil Scientists; Zhu fuzzy logic model; use of DEMs for 3-D landscape analysis; landscape analysis; Demos **(Sheryl Kunickis (NHQ), Fred Young(MO), Steve Gourley (VT)**

1:30-2:00PM **Soil Survey Investigations and Soil-Geomorphic Research**; projects around the country **(Carolyn Olson, NSSC)**

2:00-2:30PM **NCGC Soil Support Branch** resources that are available for technical soil services **(Nathan McCaleb, NCGC)**

2:30 PM **Break**

3:00-3:30 PM **Reconstructed Virtual Soil Landscapes** Demo of soil landscape modeling to abstract real soil landscapes using virtual reality **(Sabine Grunwald, Earth Information Technologies Corporation, Madison WI Email** grunwald@earthit.com**)**; Real-Time Mobile Mapping for High Intensity Soil Surveys" **(Dan Rooney, Earth Information Technologies Corporation and Bob McLeese (Illinois-NRCS).**

3:30-4:00 PM **Use of Digital Soil, Topography, and Land Use Data to estimate potential runoff. (Kyle Juracek, Hydrologist, USGS)**

4:00-4:30 PM **Lab Data—LIMS**; sampling protocols; How will we add this data to the database? ***(Dewayne Mays, Tom Reinsch, NSSL)***

4:30 PM **Review of Action Register- Team**

Thursday March 22, 2001 Moderator *Ronnie Lee Taylor, SSS-NJ*

Regency Room -- Holiday Inn

8:00-8:45 AM **Soil Survey Schedule/PRMS**---progress and policy ***(Jim Ware, Jon Vrana)***

8:45-9:30 AM **Recruitment**---OPM Standards/Needs; Where are the jobs?; Where are the new recruits?; Develop a Networking plan ***(Jason Parman, OPM Kansas City)***

9:30 AM **Break**

10:00- 10:30 AM **MLRA Project Offices**---the vision and progress ***(Tom Calhoun, NHQ)***

10:30-10:40 AM **Regional Technology Coordination in Training (Craig Dickerson, RTS, NP and Howard Thomas, RTS,W)**

Breakout Rooms- Brazilian Rooms Holiday Inn

10:40AM –12 noon **(5 Discussion Groups ~25 persons/group)**

Group 1--Resource Soil Scientists/ Training - What are the Technical Soil Services training needs? What assistance can the Centers/Institutes provide? Teaching the Public & NRCS through Short Courses. Where does the Technical Soil Scientist go for help in Preparation? Discussion of needs for assistance on short, concise course material, or how to develop short courses ***(*Earl Lockridge, NSSC, Steve Hundley, SSS-NH Topic Discussion Leaders)**

Group 2--Resource Soil Scientists/Roles&Responsibilities-- We have an opportunity at the State Soil Scientists meeting to begin the process of creating a corporate culture for tech services and thus create the future of soil survey. We might ask the following questions: What is your definition of technical soil services? What are our roles and responsibilities? What is within our scope of authority? In your opinion, what should technical soil services be? Relative to TSS, what is working well now? What is NOT working well now? If you could structure TSS to meet your needs, how would you assign roles, responsibilities, and organizational structure? What is needed to make TSS work the way you think it should work? ***(*Warren Henderson, SSS-FL, Ed White, SSS-PA - Topic Discussion Leaders*)***

Group 3--Resource Soil Scientists/Supervision Review & discussion of Technical Soil Services Report from 1997 SSS

Meeting; Supervision policy; Dedicated resource soil scientists; Priority Setting; Information flow; Co-location with project offices; PRMS data collection for Technical soil services; NRI activity; OPM Standards; NSSH Revisions. **(Darrell Schroeder, SSS-WY, Jon Hempel, SS-WI -Topic Discussion Leaders)**

Group 4--Soil Survey Maintenance/Evaluations for updates--- policy & reality; maintenance of published and out-of-date soil surveys. More emphasis on soil survey evaluation for updating soil surveys; Assist with on-going surveys; The RSS is responsible for evaluating older surveys. Who makes the revisions? Do MO's keep doing correlation amendments? Let's talk about limited revisions*)* When should Soil Technical Assistance be reimbursable*?(***Jimmy Ford, SSS OK, David Kriz, SSS-VA – Topic Discussion Leaders)**

Group 5—Soil Data Quality Specialists –Common Concerns

12 noon **Lunch**

Thursday March 22, 2001 Moderator *Mike Lilly, SSS-MS*

1:00-2:30 PM **(5 Discussion Groups cont.)**

2:30-3:00 PM **Break**

Regency Room—Holiday Inn

3-3:45 PM **Reports from Discussion Groups --Review of Action Register-Team**

3:45-5:00 PM **Director's Forum**- Panel/Discussion of Further Issues & Questions**—Horace Smith, Bob Ahrens, Rick Bigler (acting), Berman Hudson, Carolyn Olson, Tommie Parham, Maxine Levin; DeWayne Mays**
Recommendations for Policy and Procedures-**Action Register *Team & Moderator***

5:00 PM **Adjourn**

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William Dollarhide	Reno, NV	bill.dollarhide@nv.usda.gov

Computer Demos and Posters

"Ortho-recitification and On-Screen Digitizing"-Vermont
Contacts: Robert Long, SSPL, Newport, VT
Phone: 802-334-6090
Email: robert.long@vt.usda.gov
Roger DeKett, SSPL, St. Johnsbury, VT
Phone: 802-748-2641
Email: Roger.DeKett@vt.usda.gov
Steve Gourley, NRCS, VT
Phone: 802-951-6795 x236
Email: sgourley@vt.nrcs.usda.gov

"Soil Survey of the Matanuska-Susitna Valley Area, Alaska".
Contact is: Darrell Kautz
Phone: (907) 761-7762
Email: dkautz@ak.usda.gov

Interactive CD of the Interim Oklahoma County Soil Survey to demo.
Contact: Chuck Sample
Phone: 405-742-1249
E-mail: chuck.sample@ok.usda.gov

Posters of the State Soil, Port Silt Loam, copies of the History of the Soil Survey in Oklahoma, and copies of our 2001 Soil Survey Business Plan.
Contact: Jimmy Ford
Phone: 405-742-1247
E-mail: jimmy.ford@ok.usda.gov

"Making a Soil Survey"
"Soil Survey - A Tool for the Future"
Contact: Earl D. Lockridge
Soil Scientist/Training Coordinator
National Soil Survey Center MS 33
Lincoln, NE 68508
Phone: (402) 437-5863
FAX: (402) 437- 5336
Email: earl.lockridge@nssc.nrcs.usda.gov.

WinPedon computer program --This is the new Windows based pedon description program.
Contact: Jim R. Fortner, Soil Scientist
National Soil Survey Center
100 Centennial Mall North, Rm 152
Lincoln, NE 68508-3866
Phone: 402-437-5755
Email: jim.fortner@nssc.nrcs.usda.gov

Title: Landscape Analysis as a Tool for Validating Soil Map Unit Concepts
Contact: Suzann Kienast
Phone: 435-797-3404 or 435-797-2179
Email: skienast2@yahoo.com

Soils of Alabama Poster - Five physiographic provinces of Alabama and soils that are typical of the regions, plus miscellaneous soil data.
Contact name: Julie Best
Phone: 334-887-4549
Email: julie.best@al.usda.gov
"Soil Surveys on CD"
We produce these in Adobe Acrobat format. Contents include the manuscript, atlas sheets, general soil map, and interpretive maps produced with the Soil Data Viewer.
" Soil Survey Office Digitizing in ArcView"
This is where map compilation in Missouri is heading. One of our field soil scientists has adapted existing ArcView methods and scripts, and has put together a draft training manual.
" Composite DOQ/slope map images"
These provide an excellent backdrop for on-screen soils digitizing. An Arc/Info AML is used to create these, using digital hypsography and DOQs.
Contact: Fred Young
Phone: 573-876-9427
Email: fred.young@mo.usda.gov

"Soils of Guam".
It gives the Chamorro (indigenous ethnic group) legend about the creation of Guam, and divides up the soils world here into 3 groups and has pictures of each soil series in the group.
Contacts: Ken Monroe (NRCS), Peter Motovali (U of Guam), and Bob Gavenda, Resource Soil Scientist, USDA-NRCS Pacific Basin
Phone: 671-472-7182
Email: bob.gavenda@pb.usda.gov

"Virtual Soil Landscapes"
Demo of soil landscape modeling to abstract real soil landscapes using virtual reality
Contact name: Sabine Grunwald
Email: grunwald@earthit.com
Phone number: 419 448 2089 or 877 230 1430 (toll free)
"Targeted-Sampling Design based on the Entropy Concept"
Contact: Sabine Grunwald and Dan Rooney
"Real-Time Mobile Mapping for High Intensity Soil Surveys"
Contact: Dan Rooney , CIT
and Bob McLeese (Illinois-NRCS).
Phone: 608-294-5460 ext.2 or 217-353-6643

Demo CD: OrthoMapper Demo CD. (probably only 10 with us others can be made on request). Includes: Two issue papers and two powerpoint presentations. All the ortho rectified data for two atlas sheets, a historical orthophoto created as a by product during the process, and an Arcview project file that displays the ortho rectified soils information over orthophotography. The CD will also included all the original materials needed to ortho-rectifiy one atlas sheet (except the software). I do have an extra license of the software that I can lend out for a short time, if states want to try the program.
Contact: Ken Lubich
Phone: 608-276-8732 ext. 248
Email Address: ken.lubich@wi.usda.gov

Poster: Soil Survey Publication Trends Includes bar graphs of data from NASIS Soil Survey Schedule showing number of surveys published by year and decade and current status of the surveys published

or out of date). Also hope to include a status map showing where active surveys currently sitting in the publication pipeline.
Contact: Ken Lubich
Phone: 608-276-872 ext. 248
Email Address: ken.lubich@wi.usda.gov

"Automation of Compilation with OrthoMapper Software"
The poster will show the materials needed and steps to correct soil survey data to orthophotography using, DEM's, Orthophotography, and Original Photography.
Contact: Ken Lubich
Phone: 608-276-8732 ext. 248
Email Address: ken.lubich@wi.usda.gov
Contact: John Hempel
Phone: 608-276-8732 ext. 275
Email Address: john.hempel@wi.usda.gov

"Integrating State and Transition Models for Ecological Sites with the Dynamic Soil Properties Database."
Contact: Arlene J. Tugel, Soil Scientist
USDA-NRCS Soil Quality Institute
Jornada Experimental Range
MSC 3JER NMSU
Box 30003
Las Cruces, NM 88003-0003
Phone: 505-646-2660
Email: atugel@nmsu.edu
VoiceCom: 9000-345-7340

"Geopolitical vs. Ecological Frameworks and Soil Resource Assessment"
Authors: H. R. Sinclair, S. W. Waltman, and B. D. Hudson
Contact Name: H. Raymond Sinclair
Phone Number: 402-437-5699
Email Address: ray.sinclair@nssc.nrcs.usda.gov

National Collection of MLRA proposals on CD-ROM
Contact: Sharon W. Waltman
Soil Scientist-Soil Taxonomy & Standards Staff
USDA-NRCS-National Soil Survey Center
Lincoln, NE
Phone: 404-437-4007
Email Address: sharon.waltman@nssc.nrcs.usda.gov:

"Montana Electronic Map Compilation Pilot".
Contact: Chuck Gordon, State Soil Scientist/MO Leader, NRCS, Bozeman, MT
Phone: 406-587-6818
Email: chuck.gordon@mt.usda.gov.

Web Based HTML soil survey product developed in MO-2.
Contact: Kit Paris, SDQS, MO2, NRCS, Davis CA
Phone: 530-792-5634
Email: kit.paris@ca.usda.gov

"Basic Biological Factors of Soil Carbon and Nitrogen"
author: Kristina A.Goings
Contact: C.D. Franks at carol.franks@usda.gov or K.A. Goings at kristina.goings@usda.gov
Phone: 402-437-5316
email: carol.franks@nssc.nrcs.usda.gov

"Implementation of Soil Biological Analyses at the NRCS - NSSC Soil Survey Laboratory" authors: S.E. Samson-Liebig, C.D. Franks and K.A. Goings
Contact: C.D. Franks at carol.franks@usda.gov or K.A. Goings at kristina.goings@usda.gov
Phone: 402-437-5316
email: carol.franks@nssc.nrcs.usda.gov

"Field Book for Describing and Sampling Soils" authors: P.J. Schoeneberger, D.A. Wysocki, E.C. Benham, and W.D. Broderson
Contact: Philip Schoeneberger at philip.schoenberger@usda.gov
Phone: 402-437-4154
email: philip.schoeneberger@nssc.nrcs.usda.gov

"The Potential of U.S. Grazing Lands to Sequester C and Mitigate the Greenhouse Effect" authors: J.M. Kimble, R. Follett, and R. Lal (a copy of the book will also be displayed)
Contact: John Kimble at john.kimble@usda.gov
Phone: 402-437-5376
email: john,kimble@nssc.nrcs.usda.gov

Soil Biology educational materials and Field Methods. Included are: Conservation Education Materials available for check-out from NSSC. (Primarily Biological information)
"Basic Biological Factors of Carbon and Nitrogen". This breaks apart the information from the poster (see above) and makes it available as a series of 1 page handouts that can be easily copied and includes the Biogeochemical Cycle, Photosynthesis, C Cycle, N Cycle Soil Food Web and C/N Ratios. The 4 field methods are:
"Soil Faunal Extraction"
"Estimated Soil Organic Matter - Field Method"
"Separating Roots from the Soil by Hand Sieving"
"Above-Ground Biomass (Plant) Determinations"
Contact: C.D. Franks at carol.franks@usda.gov or K.A. Goings at kristina.goings@usda.gov
Phone: 402-437-5316
email: carol.franks@nssc.nrcs.usda.gov

Research Products on Display

Posters:

1. Wilson, MA. And W.D. Nettleton. 2000. Unraveling genetic processes in arid soils using micromorphology.

2. Wilson, M.A. 2001. Micromorpholoy of tephra horizons of selected Andisols, Gifford-Pinchot National Forest.

Books:

1. Lal, R., J.M. Kimble, R.F. Follett, and C.V. Cole. 1998. The Potential of U.S. Cropland to Sequester Carbon and Mitigate the Greenhouse Effect. Ann Arbor Press, Chelsea, MI.

2. Follett, R.F., J.M. Kimble, and R. Lal. 2001. The Potential of U.S. Grazing Lands to Sequester Carbon and Mitigate the Greenhouse Effect. Lewis Publishers, Boca Raton, FL.

Journal Article:

1. Grossman, R. B., Harms, D.S., Seybold, C.A., and J.E. Herrick. 2001. Coupling Use-dependent and use-invariant data for soil quality evaluation in the United States. J. Soil Water Conservation 56:1: 63-68.

Government Documents:

1. Glossary of Landforms and Geologic Terms. National Soil Survey Handbook Part 629, revised January 2001 (version currently on the web).

2. Geomorphic Description System. Version 3.0. Revised January 2001.

Soils Education Materials Online

National Soil Survey Center Soil Science Education Website:
http://www.statlab.iastate.edu/soils/nssc/educ/Edpage.html

Materials for Teachers:

How to Make a Soil Monolith:
http://www.statlab.iastate.edu/soils/nssc/educ/exp_mon.htm

Particle Size Demonstration:
http://www.statlab.iastate.edu/soils/nssc/educ/exp_ps.htm

Soil Texture:
http://www.statlab.iastate.edu/soils/nssc/educ/exp_tx.htm

Soil Organic Matter:
http://www.statlab.iastate.edu/soils/nssc/educ/exp_om.htm

Soil Erosion Demonstration:
http://www.statlab.iastate.edu/soils/nssc/educ/exp_se.htm

Soil Crayons:
http://www.statlab.iastate.edu/soils/nssc/educ/crayon.htm

INDIANA NRCS HOME PAGE
http://www.in.nrcs.usda.gov/
Education/HASTI (HASTI materials will be online by February 9, 2001)

East Central Glaciated Region MLRA 11
Soil Education Page:
http://www.in.nrcs.usda.gov/mlra11/education2.htm

Panel Discussion Items

Panel 1 – Conservation Programs (AFO, CNMP, P Indexes, Urban interps)

1. What is being done on the Urban Soil Interpretations? It seems that we talk and hear about these but not sure where we are going. Do we need to collect or populate additional data? This is area of concern as we move into these in Update phase where we can show additional interpretations.
2. The P index in the CNMP is as much political as it is technical and varies from state to state. I am convinced that there is limited data on P that should restrict an immediate wholesale NASIS population for P. What is really expected of the soil survey program in relation to P indexes? What involvement have soil scientists had in the Phosphorus Risk Assessment Tool?
3. Please provide background as to why there is no National P index or guidance and no coordinated plans for regional indexes.
4. Should soil scientists become Certified CNMP Planners for the agency? Certified Specialists?
5. What training is needed or appropriate in CNMP certification for soil scientists in the agency? How has NEDS included soil science in CNMP training curriculum? Has GPR and EMI monitoring techniques been included at least at an "awareness " level in CNMP courses?
6. In-field technical assistance—What will the resource soil scientist provide for CNMP?
7. Soil scientists in the agency could potentially be the main experts in EMI and GPR—which could be extremely useful tools for CNMP planning and monitoring. How does the agency plan to incorporate these tools into the CNMP planning process?
8. What is the agency's policy on NEPA requirements in relationship to the Animal Feeding Operations? Is this something State Soil Scientists should be planning for?
9. How can resource soil scientists be better informed about the watershed health tools and technology transfer from the Watershed Science Institute?

Panel 2 – Conservation Programs (CRP, LESA, WEPS, RUSLE)

1. CRP and Frozen HEL Lists – What are the plans to use current soils data instead of frozen data
2. CRP and Frozen HEL Lists – The frozen HEL soil map unit lists and factor values, dated January 1, 1990, are used to make erodibility determinations. CRP is authorized through 2002. Now is the time to lobby for wording change in the Code of Federal Regulations. Let's try to include wording that captures the soil values or factors in NASIS. If a NASIS warehouse is established, the data can be dumped prior to a signup and used for determining CRP's HEL land eligibility category. This program can help us work towards a consistent product. We should use the best data we have available.
3. There are soil surveys correlated since 1990. It is time to append the 1/1/90 list as outlined in the National Food Security Act Manual. Has anyone done that?

4. It should be dictated that CRP soil rental rates are derived from NASIS generated indices. If they need to be developed by some physiographic region, so be it. Stand-alone indices should be outlawed. They cause major problems at an administrative boundary. If needed, the index could represent 70% of the soil rental rate and a 30% influence could come from the county average rental rate.
5. The FSA information that we are populating in NASIS requests that the R factor be entered. There are two R-values, one for USLE (Frozen HEL) and a different one for RUSLE2 used with planning. Which one should be entered?
6. One of the biggest concerns here is the CRP and frozen HEL lists. This has been a big issue in the western part of the state where wind erosion is a big problem. Updated information shows that most of the soil surface textures are coarser that what was originally mapped, making these soils eligible for CRP. But under current rules, they are not. This frozen list rule has also really slowed, or nearly killed any interest in updating soil surveys. If the new soil information cannot be used to correct the HEL list, or improve it, why would any conservation district spend money on updating soil surveys?
7. Are we going to continue with the March 30 date for getting all of the data into NASIS for an automated CRP sign-up process? There isn't going to be a signup then so when are we going to see a retraction by NHQ for all this database work that needs to be done?
8. Will we be able to update frozen HEL lists with new K factors derived from new data?
9. Is populating data for CRP still a high priority?

Panel 3 – Publications

1. What is the current backlog of manuscripts at Fort Worth awaiting publication, what is the cause of this backlog, and what solutions are being sought?
2. The biggest problem for publication is the lack of dollars budgeted for it. What will be done to allocate more dollars toward publication?
3. Can local money get some of the hung-up manuscripts published? If so, how much and for which ones?
4. When can we have reliable methods of letting Districts and other cooperators know a time frame for publications? Right now, some of them are considering in-house publications for sale to the public since NRCS is not providing a publication. We'll look pretty bad if we publish right after a District has invested thousands of dollars. Some of the cooperators can't wait any longer and are feeling (and rightly so) that we are not fulfilling our end of the MOU's.
5. It is a definite disservice to the field soil scientist to have the hard work that they have done go unpublished for so long. One of the things they have always been proud of was the public use of their soil surveys. When is NRCS going to budget sufficient dollars for publication if for no other reason than to acknowledge the superior work done by our field crews?
6. How do we decrease the backlog of completed but unpublished soil surveys? With the move to the MO concept non-MO state offices were left with staff deficiencies

and some states pushed forward with the mapping and did not complete some of the survey publications. With current staff that is 100% occupied with current duties. Some suggested ways? Should current staff shift from acres to publications? This is not always possible with staff individuals (type of expertise available). If we shift how will this effect future funding?

7. How can we get the MO's to correlate surveys that have been done for years? Some of these were "mapping complete" prior to the MO concept.
8. General soil maps - what do the MO's want? ARC coverage, ArcView, just soil polygons, or all annotation plus the roads and streams? What is required if the state does want to publish with the GSM's? There needs to be some real guidance here.
9. What is the current projected time to publish a traditional soil survey that enters the pipeline today?
10. What support is available for development of CD technology?
11. What financial support is there for publishing local soil reports?
12. The trend is toward automated data, publications, etc, don't forget there is still a large segment of society who need a hard copy approach.

Panel 4 – SSURGO & Map Finishing

1. No question here, just a comment. We went through several years of trials and tribulations with the SSURGO work until now we have a well-tuned machine that has produced over 1000 certified surveys. Even though digital map finishing is causing a similar level of headaches in its infancy, it too will soon be running wonderfully and we'll have more maps than ever. Hang in there, and trust the folks running the show on this one!
2. Who has the final say on quality, and who really has responsibility for what?
3. Map finishing - should digitizing roads and streams be done by digitizing units and/or map finishing centers? After all they have the hardware, software and expertise to complete the task. States have been encouraged to not do these functions.
4. When are states realistically going to send new NASIS downloads to digitizing centers for re-certifications?
5. Map Finishing - what to do when soils, roads, streams and names are all on top of each other I narrow valleys at 1:24000?
6. MF Centers should be using the DOQ's during their process.
7. NASIS - is still too slow through the network in some offices - including at least some of the State Offices where IRM support or use of routers/smart switches is lacking. Days of poor weather Region wide often causes the machines at the MO to slow on top of slow transmission rates.
8. Error Reports for SSURGO downloads - why does it bomb out after it finds the first error without scanning the rest of the report so that you do not have to continue to run the same download over and over.
9. It seems that we need to rethink our training in NASIS for the field staff. It appears that we do have a good deal of specialty courses for the "super user" out in the State Office or MLRA offices however the basic introductory course is about it for the field. A course that goes further into time saving steps and recommended procedures

for efficient data population. Even setting up a user group of ideas for different needs at the field level. Intermediate and advance courses. NASIS has so much - we need to teach and use some of it.

10. What are the current costs to the states for getting new surveys certified?
11. What financial support is available to offset a drain on state budgets?
12. What plans are there to update certified SSURGO counties on an as needed basis to respond to new data requirements?

Panel 5 – Public Distribution & NASIS

1. When and how will field offices be able to produce soils reports similar to those that were available from FOCS?
2. Will the test NASIS report generator be kept on line? All of our field offices that are using it are very pleased and want it maintained. When will the field offices be able to obtain non-technical descriptions from the Web? Can those be generated by NASIS in a consistent format?
3. I believe all interpretation information/data elements should be removed from NASIS! NASIS should house data. NASIS data should be used to generate interpretations in standard reports or linked to some other software applications.
4. Several interpretation models use NASIS data. How are these models going to be linked to CST or Soil Data Viewer?
5. In NASIS 5.0, the SSURGO product is going to match the FOTG. The FOTG is updated on short notice at times. How will SSURGO be updated to stay current with Field Office FOTG needs? (Example 1 - A new table is added to all counties. Example 2 - As new wetland determinations are done, there is a need to update the hydric soil list in the FOTG 3 times in 3 months.) MrSID? Compression software would benefit the agency in getting digital data out to the field. Why not move ahead and utilize this technology. Increase capability at the APFO, NCGC, or at the state office level.
6. On the GIS side, which is often the soil side - how are we going to be able to provide the necessary data to the field offices? Bundle the geographic data, reformat, acquire and distribute the data in a way that the field can use the data? What's new and different with 5.0?
7. What needs to be accomplished, data populated, training given etc to make soil data viewer an effective tool?
8. NASIS Web reports - I haven't look at these. What's available here that is not available in NASIS through the MO?
9. What is official data?
10. How can a traditional published soil survey be useful in an age of instant updates?
11. How is official data going to be coordinated? Most offices can choose between FOCS/Customer tool kit, FOTG, NASIS (If a soil scientist is available), or published soil survey. In addition some offices have access to SSURGO data. All of these sources are essentially a snap shot in time.

Other Questions for speakers and panelists

1. Do we have a figure for the "worth" of the work performed by a Resource Soil Scientist to a community?
2. I have been thinking of this for about 2 years now, and still seem to be getting mixed signals. In the past some national funding support was provided to several states for putting soil surveys on the web, in particular Arkansas has done this. Where are these application protocols for the new web based technologies? I feel that some guidance and national technical consistency protocols needs to be provided to states for this to happen. I would hope that we all don't reinvent the wheel as it seems now, but I don't want to be waiting for something that will never happen. What is taking place, if anything, to assist states in web based soil survey reports?

3. NCGC has not been able to obtain basic field mapping imagery for our new surveys the past 2 years due to a lack of funds. Are there adjustments that can be made to ensure that new survey areas get priority over update areas that apparently are getting funded imagery? This has become a credibility issue with MOU signatures - such as conservation districts expecting NRCS assistance.

4. We are aware of a 1990 and 1995 team (task force) charged with developing and/or revising the data elements and percentages used in the CO-02 State budget allowance formula. These teams were led by Roth, Calhoun, Schellentrager, et al. It would be useful to have a copy of the current version as a tool to justify and/or defend current and proposed staffing levels.

5. National Soils Handbook Circular 1 dated May 26, 1993 contained policy and procedure for circumstances where soil survey is implicated in regulatory land use programs. The circular was signed by the Deputy Chief for Technology and is in effect until amended into the NSH. We have cited the circular numerous times but have not been able to locate this policy and procedure within the current NSSH. Is this just an oversight or has policy changed?

6. I suppose it pointless to question the flood of directives, bulletins, initiatives, priorities, updates, etc that are on the plate. I suppose it is quietly understood but not discussed that states can't complete the flood within the imposed timeframes. I suppose it pointless to ask why we aren't asked for input on our capacity to complete the workload within imposed timeframes.